The

Electrical Review

VOL. CVII. DECEMBER 12, 1930. No. 2768.

THE OLDEST ELECTRICAL PAPER. ESTABLISHED 1872.

Published every FRIDAY Price 6d.

Chairman and Joint Managing Director: G. H. ALABASTER, COMPANION I.E.E.

Technical Editor. C. O. BRETTELLE, M.I.E.E.

Joint Managing Director: E. A. GATEHOUSE, M.I.E.E., A.M.INST.C.E.

Commercial Editor: A. H. BRIDGE.

Manager and Secretary: E. S. MIDDLETON.

OFFICE: 4, LUDGATE HILL, LONDON, E.C.4.

Telegraphic Address: "AGEEKAY, CENT, LONDON." Code, A B C. Telephone No.: Central 6871 (6 lines).

The "Electrical Review" is the recognised medium of the Electrical Trades, and has by far the Largest Circulation of any Electrical Industrial Paper in Great Britain.

SUBSCRIPTION RATES, Postage Free: United Kingdom, £1 14s. 6d.; Canada, £1 12s. 6d. Colonial and Foreign, £2 1s. 6d. per annum. Cheques and Postal Orders on Chief Office, London) to be made payable to THE ELECTRICAL REVIEW, LIMITED, and crossed "Midland Bank, Newgate Street Branch."

For List of Foreign Agents for the ELECTRICAL REVIEW see Advertisement Supplement.

Contents:

	PAGE
The Future of the Fair	981
Distribution at Billingham	982
The Successful Contractor	982
Loud-speakers	982
Shop-lighting	983
Barton Power Station	983
Industrial Heating and Control	983
The Modern Note	983
The Inimitable Iron	983
The British Industries Fair	984
Imperial Chemical Industries, Ltd. *(illus.)*	986
Small Push-bar Switches, by L. G. H. Sarsfield *(illus.)*	993
The First Essential, by H. R. Taunton	995
Electricity for the Home *(illus.)*	997
Business and Industrial Notes	999
Lighting and Power Notes	1003
Tramway and Railway Notes	1005
Telegraph and Telephone Notes	1005
Radio Notes	1006
Contract Information	1006
Forthcoming Events	1007
Notes	1007
Our Personal Column	1010
Financial Section—	
New Companies Registered	1011
Official Returns of Electrical Companies	1012
City Notes	1012
Financial Section—*contd.*	
Stocks and Shares	1013
Italian Foreign Electrical Trade	1015
The Uruguayan Market	1015
Radio Manufacturers' Association	1016
A Continuous-heating Installation *(illus.)*	1017
Modern Electric Lighting	1018
Private Power Plant	1019
New Electrical Devices, Fittings, and Plant *(illus.)*	1020
New Trolley 'Buses *(illus.)*	1021
Some Radio Developments	1022
Legal	1023
Parliamentary News	1023
Correspondence—	
The Prevention of Accidents	1024
Problems for Research	1025
Too Old at Forty?	1025
Holding Companies	1026
British Motor Prices	1026
Hire-purchase of Electric Irons	1026
Heating and Ventilation	1026
An Order-book Suggestion	1026
E.D.A. Advertising	1026
Electric Cooker Design	1027
Published Specifications	1027
Trade Mark Applications	1027
New Work for Contractors	1028

The Future of the Fair.

THE view which we have steadfastly held since its inception that the British Industries Fair is a potent means of fostering British industry and commerce receives ample confirmation from the report of the Chelmsford Committee, published last week and reviewed in this issue. Our faith in the Fair is now, we believe, shared by a very large section of the electrical industry to whom for years we commended the Fair before steps were taken to secure representation worthy of the industry's importance at home and standing in British export trade. Now we can feel almost satisfied that electrical manufacturers realise the potentialities of the Fair and intend to continue their support.

The Committee, of which Lord Chelmsford was president, was composed of men well acquainted with the subject. They heard the views of many and diverse interests, and thus equipped and guided have produced a report which must receive the serious consideration of all who wish to see the Fair strengthened and widened in its scope. Many recommendations are made dealing with totally different aspects of the Fair, but the key-note of the report, to which they are all attuned, is expressed as follows:—

"The Fair should be developed . . . so as to become a truly national manifestation of the quality and range of British products and an increasingly powerful factor in the expansion of our trade. The Government, and manufacturers generally, should accord it more vigorous support, and the public should be encouraged to learn through the Fair that British manufacturers can supply their needs."

There is evidence in this paragraph that the Committee realised that the greater part of the business at the Fair is placed by home buyers. Although this is not the primary object of the Fair, it cannot be said that it is an objectionable feature. At the same time, the Fair has been organised as a means of expanding export trade, and this aspect has to be stressed. Everything possible must be done to attract overseas buyers, and that is why the Committee recommends that the Department of Overseas Trade should continue to control the expenditure of the publicity fund towards which a Government grant is made. The D.O.T. has a network of representatives in all parts of the world, representing an existing propaganda organisation which would cost

an enormous amount to duplicate. These officers of the D.O.T. have been handicapped by lack of funds hitherto, but if the Committee's recommendation that the Government grant should be quadrupled is accepted, there will be a definite improvement in this respect.

The Committee, as we have said, desires to see the Fair strengthened and widened in its scope; for this reason it deprecates the dissipation of effort involved in a second Fair in the autumn, subsidiary or sectional fairs, or travelling exhibitions. It is also considered undesirable to raise the charge for space to exhibitors; and desirable to admit the public to the Fair with reasonable restrictions.

All of the foregoing recommendations are in consonance with the views expressed in the memorandum submitted to the Committee by the Electrical Advisory Committee of the Birmingham Section. There is one point, however, upon which there will not be unanimous agreement. It was raised by MR. E. E. SHARP in his criticism of the D.O.T. in our last issue, and replied to by MR. G. M. GILLETT, the Parliamentary Secretary of the Department. We refer, of course, to the question of the date at which the Fair should be held. We shall not repeat the arguments for and against the continuance of the present arrangement, which are to be found in our review of the Report, but we must say that the before-mentioned memorandum contained a declaration that the present date was considered unsuitable upon several grounds, and that some electrical exhibitors had withdrawn for that reason alone. On the other hand, the Committee states that the leading trade associations gave a majority opinion in favour of February.

The Committee's recommendation may cause a number of electrical exhibitors disappointment, but we ask them to weigh up the arguments very carefully, remembering that the whole of British industry has to be considered, and they will find that the Committee has not adopted an uncompromising attitude based merely on a hatred of change.

It must be remembered that with the period fixed in February the Fair has made remarkable strides in the last few years. It may be that this rate of growth would be accelerated by a change of date, but there can be no guarantee of this.

But for this one point everybody concerned will agree that the Report expresses their views and wishes and will desire to see it acted upon. We trust that electrical exhibitors will not condemn the whole for that one part, but resolve with the Committee to raise the Fair to such a position that overseas buyers will not be able to afford to neglect it.

Distribution at Billingham.

POWER stations achieve, as a rule, a larger amount of publicity than do electrical distribution systems. It is possible, however, that their greater general appeal is not based entirely on scientific or commercial grounds, but has its emotional side. On the other hand, distribution is rapidly growing in importance relatively to generation and now offers the greater field for economies.

With this in mind we have given from time to time accounts of notable distribution systems, including those in many large works. In this issue we give the first part of an article based on a visit recently paid to the Imperial Chemical Industries, Ltd., at its Synthetic Ammonia and Nitrates Works at Billingham-on-Tees, to which is delivered the output of the power stations at Billingham, which formed the subject of a paper read before the I.E.E. last session.

There are many notable features in the lay-out of the Billingham electrical system which we believe will be of considerable interest to distribution engineers, whether in large works or on public supply undertakings. Among these are the developments which have taken place in sub-station design, resulting in a considerable reduction of cost. On many counts, apart from its mere magnitude, the installation is a remarkable achievement.

The Successful Contractor.

IN this issue we conclude MR. H. R. TAUNTON'S article on "The First Essential." Mr. Taunton expresses his agreement with the dictum that 'tis not in mortals to command success, but he proceeds to show how electrical contractors may do their utmost to deserve it.

The business of the electrical installation engineer presents great difficulties on the "sales" side. The principal items in his stock-in-trade are knowledge and workmanship, and it is not easy to produce and carry round attractive examples of these. True, reference may be made to installations already carried out, but clients are not always willing to permit inspections by prospective clients of their offices, houses, shops, or other premises.

The contractor must have a nose for "openings"; he must get in on the ground floor before the plans are drawn, if such a thing is possible. Moreover, he must make useful friends—a most difficult thing to do—friends who will drop him hints of future work before others get to know about it. The author deals with the qualifications of the outside representative, who, he says, is the most likely means of securing orders. The ideal representative, whose multitudinous virtues are drawn, must be very rare; if a man possessing only half of the qualifications set forth can be engaged, the opportunity should not be missed. A man with them all would not be an outside representative long, we think.

The author counsels the systematic watching of all inquiries by means of a card index. Careful persistence in the pursuit of an inquiry often leads to its conversion into an order. These points, and others put forward by the author, make the article of interest and use to others besides electrical contractors.

Loud-speakers.

THE large attendance at the I.E.E. last week at the lecture given by MR. S. G. BROWN on "Loud-Speakers, Gramophone Pick-ups, and Wireless Recording Apparatus" provided evidence of the large proportion of the membership that interests itself in light-current matters. It also showed the popularity of practical demonstrations. The lecture, which provides an outstanding example of how later investigations have established the theories underlying the work of a practical inventor, is summarised elsewhere in this issue. Mr. Brown seemed to prophesy the ultimate elimination of valves in gramophone reproduction by the development of the microphone amplifier, and such an outcome would, of course, considerably modify loud-speaker design. Meanwhile he clearly prefers the horn to the cone type, the popular demand for which he attributes to "fancy." We are inclined to attribute the general choice to the desire for a compact instrument, as a horn of 20 ft. long, which DR. W. H. ECCLES mentioned as better than anything, becomes somewhat unwieldy for household use. A promising development is the reduction possible in the weight of permanent magnets for moving-coil loud-speakers. By operating the magnet through levers, instead of attaching the coil direct to the cone, it has been found possible to reduce its weight by nearly 80 per cent., but such a design would presumably call for very great care in assembly.

We have still a long way to go before we can look forward to a really clear definition of individual instruments, combined with satisfactory reproduction of their overtones, which make all the difference between a real representation of music and a mere photographic copy. Those who remember "listening in" before the war and making futile endeavours to decodify morse signals can appreciate the enormous advances made in a relatively few years, and the full significance of the fact that it is now barely eight years since the B.B.C. started up.

Mr. Brown was rightly referred to as a pioneer. The fact that 25 years' work on investigations into this branch of electrical engineering entitles him to the distinction is proof enough of the exciting age into which we have had the good fortune to be born.

Shop-lighting.

WE have received from the British Electrical Development Association a tabulated report upon the results of a survey of about 6,000 shops in the course of the Shop and Display Lighting Campaign. This is interesting mainly because it indicates the immensity of the scope for improvement in this direction, with a consequent influx of business to the manufacturers of equipment and electrical contractors.

Twenty-six towns of varying size were covered, and it was found that the vast majority of shops in those places employed simple drop pendants. As a rule, when reflectors were installed, insufficient intensity was the result through "economy" in lamps. In only three towns did the average wattage of the lamps employed reach 100. While in the majority of cases the wattage was between 80 and 100, there were two towns in which it fell below 70. Generally, the use of after-hour lighting was badly neglected, but in Dundee it was found that 68 per cent. of the 177 shops inspected kept their lights on after closing time, and in Southport just over half of the 65 shops surveyed did the same. The number of shops with illuminated facia signs was practically negligible, and outside signs were used by only a small number of shops in most of the towns. The highest percentage (33), strangely enough, was in Amble, a town with a population of about 5,000.

Although the Campaign has officially ended, contractors should keep it going in their respective districts with a practical certainty of profitable results.

Barton Power Station.

THE injunction against the Manchester Corporation in respect of the nuisance of the Barton power station has been dissolved. This, from the viewpoint of the Corporation and its officials, must be regarded as a happy issue out of their troubles. We wish, however, that it could be recorded that the present position had been reached as a result of complete abatement of the nuisance, but according to a letter written to the *Manchester Guardian* on behalf of the National Farmers' Union such is not the case. The Corporation has in effect "cut the Gordian knot" by coming to agreement with Mr. Farnworth and by taking over the tenancy of his farm with liabilities for dilapidations.

On the other hand, we may regard the action of the Corporation as having been influenced by the expiry of the time limit named when the injunction was granted. The Corporation has not applied for the dissolution of the injunction on the ground that all reasonable methods of preventing mischief to the complainant have been exhausted, and experiments are still being carried out. Last year the House of Lords was not satisfied that a power station could not be operated without causing a nuisance. We believed then that this view was correct, given time for investigation of all the problems involved. The recent publication of the result of tests made with regard to the Battersea station substantiates this view.

Industrial Heating and Control.

THE ease and accuracy of control of electricity supply for industrial heating, as indeed for any other purpose, is one of its greatest assets and, *properly handled*, the stoutest plank in the platform of the electricity supply propagandist. We emphasise properly handled because we are not sure that undue persuasion is not sometimes offered to the consumer in the form of too cheap electricity. It is a somewhat delicate point, for automatic control offers advantages to both the consumer and the supplier—to the consumer by way of economy in consumption and, what is more important, economy in works production and operation, and to the supplier in that it tends to diversity-factor and load-factor improvement—and each should pay for the advantages peculiar to itself. The enthusiasm of all established industrial-heating consumers is directed towards the ease and simplicity of control, and not *cheap electricity*.

We describe elsewhere in these pages a 60-kW installation which has been adapted to an existing coke-fired system simply by connection to the flow and return pipes. It is designed to provide automatically a constant temperature day and night under all atmospheric conditions, and its loading can be varied at will and in easy stages from 7 to 100 per cent. The space it occupies is practically negligible. What other medium of heating could fulfil such exacting conditions?

The metering arrangements for the installation in question are highly creditable, and indicate that any method of charging, involving changes in both load and output charges, can be satisfactorily provided for. It is, however, a pity that anything in the way of complicated apparatus is necessary.

The Modern Note.

IN the articles on "Modern Lighting" included in our issues of October 24th and 31st, the case for regarding illumination from the modern point of view and the need for co-operation between the architect and the electrical engineer were convincingly set out.

The discussion opened by Messrs. R. D. BEST and R. MCGRATH under the auspices of the Design and Industries Association, and reported on a later page, carries the question a stage further. There is a danger that, in the endeavour to avoid being bound by the traditions of our forefathers, a line of least resistance may be chosen in the imitation of Continental models. While these may be regarded as worthy examples of freedom in development, they cannot be accepted in substitution for efforts to work out our own salvation, which must have its roots in a healthy national consciousness. From the point of view also of the effect on our export trade, we are not likely favourably to impress people in other countries by designs owing their origin to foreign inspiration.

Another kind of imitation to avoid is that derived from the assumption that natural lighting effects are necessarily the best. The conditions to be met are not those of nature but of a highly sophisticated urbanisation, and our methods of application must take this into account.

Pertinent to this subject is the lecture delivered by MR. R. J. R. LEATHART before the R.I.B.A. This furnished evidence of the attention now being given by architects to the proper use of artificial light; it is very important, as has been implied above, that the members of that profession should grasp the importance of the use of illumination as an integral part of building design.

The Inimitable Iron.

MR. T. A. G. MARGARY, M.I.E.E., borough electrical engineer, Wolverhampton, in our "Correspondence" columns in this issue focuses attention on a scheme for the hire-purchase of electric irons on a weekly payment basis. A number of creditable schemes designed to bring about wider usage of the inimitable iron has come to our notice. In a recent issue, the Fulham electricity supply undertaking was cited as hiring out irons at 6d. a quarter, and a year or so ago we had occasion to comment on an iron-selling campaign by the Pooley Hall undertaking.

The electric iron is an excellent forerunner to larger business, and it conveys the "electric idea" more adequately than any other appliance. It was put to us by an authority some time ago that, from the publicity point of view, an order for an electric iron was more important than one for a cooker. While we cannot imagine all supply engineers falling in with that view, we do advocate strongly that fuller advantage should be taken of the unique propaganda value of the electric iron. This inexpensive and adaptable apparatus points particularly forcibly in many ways to the utility of electric service, and it will do hundred-and-one odd jobs that nothing else will do so conveniently or so well. The load represented by an iron per consumer would also be very useful.

The British Industries Fair.

Recommendations by the Chelmsford Committee for Extending its Scope and Increasing its Value.

In February last the President of the Board of Trade appointed a committee under the chairmanship of Lord Chelmsford "to examine the present situation as regards the British Industries Fair and to consider what means can be adopted to increase still further its utility to British trade." After holding 24 meetings, during which 41 witnesses were examined, the Committee has now published a report containing its recommendations.*

At the commencement of its report the Committee reviews the conclusions of the Warner Committee which issued a report on the Fair in 1921. This Committee concluded that the ideal arrangement was to concentrate the Fair in London, but that the Birmingham Section should continue so long as it received sufficient support; the Glasgow Section had been inadequately supported and should be closed. The Committee did not favour the opening of further branches, the holding of a second Fair, or the alteration of the date. The importance of systematic propaganda was emphasised. In general, the Warner Committee's recommendations were adopted by the Board of Trade.

The Chelmsford Committee was asked particularly to investigate the possibility of extending the scope of the Fair; the question of the date and the desirability of holding a second Fair in the autumn; the limitation of participation to manufacturers; the best means of financing and carrying out the advertising of the Fair (raising the question of an increased charge for space); the possibility of holding the Fair, or sections of it, abroad; and the possibility of organising a travelling Fair. The witnesses who gave evidence were representative of the Department of Overseas Trade, the Birmingham Fair Management Committee, the overseas service of the D.O.T., the Dominions, the exhibitors, manufacturers (including the B.E.A.M.A.), the railways, the Press, and buyers.

The History of the Fair.

The report reviews the history of the Fair from its inception in 1915 as a means of introducing to the home market British-made articles which prior to the war had been imported. The success of the first Fair led to the decision to continue it, and from 1916 to 1920 it was held in various places, going to the White City in 1921, where it remained until 1929, when a move was made to Olympia. The Birmingham Section was instituted in 1920 and has since steadily grown in size and importance. A section was organised in Glasgow in 1917, 1918, 1920 and 1921 and was then discontinued. In 1924, to enable visitors to the British Empire Exhibition to see the British Industries Fair as well, the date was changed to April and May. Whether due to the change of date or to the competition of the British Empire Exhibition, the Fair proved disappointing to exhibitors. In the following year only the Birmingham Section was organised. After these two years the prospects for 1926 were not favourable and the Government was asked to grant £100,000 for advertising the Fair. Only £25,000 was sanctioned, however, but this grant has since been continued. Reference is made in the report to the moving of the London Section and the adequacy of the accommodation at Castle Bromwich, Birmingham, buildings and site.

It is considered that the Fair is still far from representative, even at Birmingham where development has proceeded on more systematic lines than in London. Among the industries particularly mentioned as not being represented, or inadequately represented, are the motor-vehicle, machine-tool, wearing apparel, and woollen textile industries. In many cases, it is felt, abstention is attributable to lack of appreciation of the value of the Fair and fear that designs may be "pirated." There are said to be signs that this British prejudice against fairs is weakening. Firms are urged to judge the Fair not only by its immediate results; they should also look to establish contacts from which actual orders may come later. Orders have been received long after participation, but clearly as the result of it.

The Government Grant for Publicity.

The Committee, after hearing evidence on the point, is convinced that the present Government grant for advertising is insufficient, especially when it is considered that propaganda for the Fair is propaganda for British industry as a whole. The general weight of opinion is against compensating for this by increasing charges to exhibitors, although the latter in their own advertisements should help to secure publicity for the Fair. The grant compares very unfavourably with that made to the Empire Marketing Board which is not so important to British industry as the Fair. After meeting the cost of the printing of showcards, pamphlets, &c., the issue of letters to buyers throughout the world, announcements in the home Press, and other necessary expenditure at home, the residue of the present grant available for newspaper and other direct publicity in overseas countries is "ludicrously inadequate."

The Committee considers that the minimum amount of the grant should be £100,000, and that the grant, instead of being made from year to year, should be established. The administration of the grant should remain under the control of the Department of Overseas Trade, but a special expert committee, with official representation, should be set up for the sole purpose of directing its expenditure. A competent officer should be appointed to deal with advertising and publicity, with, perhaps, the aid of a publicity expert. The services of the Government's overseas officers should still be retained as they are best able to judge what are the most effective propaganda methods in their particular countries. It has been suggested that special agents, with linguistic attainments and industrial knowledge, might address meetings of potential buyers in the chief foreign commercial centres.

The continuance of the Mansion House banquets in connection with the Fair is advised, supplemented, if possible, by others which would permit of their being attended by a larger number of buyers.

February or May?

One of the most important problems before the Committee was the date of the Fair. The Warner Committee was against a change, considering that the present date, immediately prior to the Leipzig Fair, was generally the most satisfactory. The arguments against the retention of the present period were that the Fair tended to be overshadowed by the large and important Leipzig Fair; that a large number of visitors arrived in this country in the spring or early summer, especially from America and the Dominions; and that May is a more suitable time for certain export trades, some seasonable trades being conspicuously averse from exhibiting in February. The Committee says, however, that many, if not most, of the last-mentioned industries might readily adapt themselves to the present date. It is recognised that it is impossible to satisfy every industry and that the Fair authorities must be guided in the choice of date by the recom-

* H.M. Stationery Office (Cmd. 3726), 6d. net.

mendations of the Joint Committee of the London and Birmingham Sections. It was suggested that the difficulty might be overcome by a series of secondary fairs organised consecutively by particular industries under the auspices of the main Fair. The Committee thinks that, in any case, the authorities may have to consider this as a temporary expedient if there is a big extension of the Fair in the near future.

The leading trade associations, notably the Federation of British Industries, the Association of British Chambers of Commerce and the National Union of Manufacturers, gave a majority opinion in favour of retaining the present date for the Fair. The Committee thinks that while at present the Fair may be overshadowed by the Leipzig Fair, it is convinced that the Fair can in due course attain such dimensions that no important buyer will be able to neglect it. Against the plea that the Fair should be held later in the year when the bulk of visitors from abroad begin to arrive, the Committee was assured that the professional trade buyer, upon whose presence the success of the Fair depends, is not influenced by anything but business motives. While the desirability of attracting as many overseas visitors to the Fair as possible is recognised, the attendance of the trade buyer must be the primary consideration. It has been stated that many American buyers go straight to Leipzig without visiting the British Industries Fair, showing that it is not the date which deters the buyer from attending. The cotton textile trade, a seasonal trade and the most important exporting branch of industry, has decided to join in the 1931 Fair. This, and the fact that this year's Cotton Textile Exhibition was held in February, are significant. February is the time when the big stores do much of their buying; moreover, this date having become recognised possesses a "goodwill" value. Therefore, pending any great development of the Fair which may introduce fresh considerations, the Committee recommends that the Fair should continue to be held in February.

The Committee also considers that an autumn Fair is not to be recommended as it would lead to a dissipation of effort and diminished effect. The Fair should be kept open on the Saturday of the second week, the public being admitted. It is thought that a site easily accessible from Central London should be acquired and equipped with buildings for the London Section of the Fair, capable of extension as required. A committee should be appointed to formulate definite proposals. The Committee agrees that the present arrangement whereby the "heavy" industries exhibit at Birmingham should stand, but with this exception it favours the concentration of the Fair in London.

The Public and the Fair.

The admission of the public to the Fair is said to be desirable, as well as a means of raising revenue. At Birmingham the existing arrangement by which the Fair is open to the public all day (upon payment) should stand; in the case of London the public should be admitted all day Saturday and after 2 p.m. on other days. Inquiry kiosks should be provided to put members of the public into touch with retail distributors of exhibited goods. Exhibitors are asked to exercise greater discriminations in compiling lists of "trade buyers" for the issue of tickets. While the existing regulation confining eligibility to exhibit to actual manufacturers or sole distributors of goods produced in the British Empire should stand, it is agreed that in certain trades, notably textiles, there should be a relaxation of the rule, as recommended by the Warner Committee. The Committee deprecates any feeling that competition exists between the Fair and exhibitions organised by trade associations, and the possibility of some of these exhibitions forming part of the Fair is hinted at.

The Fair must retain its national character. Not only would it be difficult for the Government to promote a Fair which was not purely British, but to entertain a policy of internationalising the Fair would be to strike at the root principle underlying its creation. It is considered that the lay-out and general appearance of the B.I.F. compares unfavourably with the Leipzig Fair. Exhibitors are asked to endeavour to improve matters in this direction, and the employment by the Fair authorities of an expert to assist exhibitors, free of charge, is recommended. The necessity of the collaboration of interested bodies to arrange hospitality and to assist overseas buyers is stressed.

Home and Export Trade.

It would appear from the evidence that by far the greater volume of business done has been with home buyers, and that the Fair has had much influence in stimulating the home trades to replenish stocks with British goods. While the Committee welcomes the valuable part which the Fair is playing to help our domestic trade, it cannot ignore the paramount importance of our export trade, and it urges that everything possible should be done to attract overseas buyers.

The Committee believes that the greater the scope and representative character of the Fair, and the greater the intensity of the publicity campaign, the greater will be the attendance of overseas buyers. Consideration should be given to the inclusion in the Fair of an exhibit of industrial art with a view to the improvement of design in certain classes of manufactured goods. Exhibitors should provide representatives with authority to meet any special requirements of buyers.

The Committee thinks that the question of holding the Fair, or sections of it, abroad might be left to the special committee which has been appointed to advise the D.O.T. upon the question of British participation in overseas fairs and exhibitions. There appears to be considerable reluctance on the part of British industry to support schemes for exhibition ships and trains. The Committee does not think that the administration costs of the Fair are extravagant, and it stresses the need for specially-selected officers to be continuously employed in the administration of the Fair. Although some witnesses thought that the London Section should be organised by private enterprise, the Committee considers that the successful administration of the D.O.T. should not be disturbed on "theoretical" grounds.

Confidence in the Fair's Future.

The report concludes with the Committee's hearty commendation of the Fair in the following terms:—

> "We are confident that the British Industries Fair can be made a powerful factor in our commercial development. We would urge His Majesty's Government, on the one hand, and the industrial and trading community, on the other, to give their whole-hearted support to developing this enterprise on the lines we have recommended, so that it may become more and more a true manifestation of our national manufacturing resources and play an increasing part in the furtherance of British trade."

The Committee's conclusions and recommendations, in summarised form, are appended to the report and at the end the various industries and trades represented in each of the two sections are set out.

The Electrical Section of the B.I.F.

Satisfaction with the greatly improved arrangements for visitors at the Birmingham Section of the British Industries Fair next February was expressed at a recent meeting of electrical exhibitors at the Birmingham Chamber of Commerce. Mr. T. R. Martin, chairman of the Electrical Advisory Committee, said that it would be appreciated that with the enormous growth of the Fair there were heavier responsibilities on the administration. Next spring there would be three official "Electrical Days," February 19th, 21st and 24th, when representatives of over twenty electrical associations would be entertained, in addition to receptions throughout the Fair to some sixty other bodies such as builders, hardwaremen and ironmongers, architects, engineers and export merchants.

Among a number of interesting suggestions put forward by exhibitors was one that hotel accommodation in Birmingham and district should be reserved for buyers and not practically monopolised by exhibitors and their staffs, as was stated now to be the case. It was decided to take steps to ask exhibitors to find other accommodation and, so far as possible, leave the hotels and principal private hotels at liberty for trade visitors.

Imperial Chemical Industries Ltd.

Synthetic Ammonia and Nitrates, Ltd., works at Billingham-on-Tees, a vast organisation served by one of the most remarkable electrical installations in the world which has never previously been described.

THE factory of Synthetic Ammonia & Nitrates, Ltd., is certainly the largest chemical works within the Empire and must be among the largest of its kind in the world. It occupies an area of 1,100 acres on the north bank of the River Tees, and the magnitude of its operations may be gauged from the number of men engaged during the period of construction, when at one time 13,000 men were on the pay-roll. The lay-out of the works in streets with cross roads creates the impression of a self-contained industrial town which is of a size sufficient to warrant the use of a motor-car for making a tour through it within a reasonable time. This impression is heightened by the knowledge that the town possesses its residential suburb in the form of an electric village built by the company for the housing of a portion of its employés.

The attention of electrical engineers has been turned to Billingham lately by the monumental paper read before the I.E.E. last spring describing the high-pressure steam power station at this factory.* Views of this station are given in figs. 2 and 15; fig. 2 shows three 6,600-kW feed-heating sets on the right and Mather and Platt high-pressure pumps on the left, and fig. 15 one of the 12,500-kW primary turbo-alternators (on the right near the top) and the two 12,500-kW condensing sets (centre).

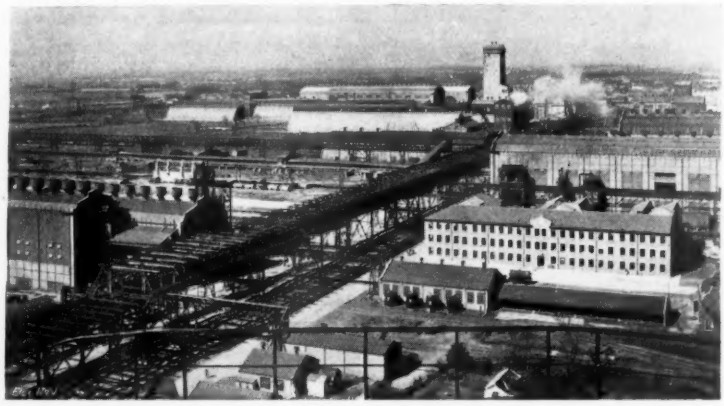


Fig. 1.—View of Typical Section of the Factory.

While the Billingham power station was designed recently to take advantage of the latest technical developments and to meet known load requirements, the distribution system has been a growth of several years, during which engineering practice has been subject to considerable modification. Nevertheless, due to the foresight with which the original system was laid down, little difficulty has been found in adapting it to the needs of the ultimate scheme; for instance, the routes of the buried cables were so well chosen that the enlarged factory buildings have not encroached upon them.

An idea of the ramifications of the electrical system may be obtained from the diagram in fig. 20, and of its magnitude from the facts that the number of motors installed totals 4,000 of an aggregate h.p. of 120,000, and that the length of cable in service, excluding cables between motors and starters within plant buildings, is approximately 132 miles. These with their associated transformers, switches, and other electrical apparatus were the products of 30 manufacturing firms.

A dozen years or so ago the site had at its focus a small farmhouse, Billingham Grange, which still stands with a neighbouring tree, and may be seen on the extreme right at the bottom of fig. 1, from which figure may also be obtained a view of the present appearance of what was once an undulating waste. The initial factory consisted of one building which housed all the various processes, but the extensions begun in 1926 were developed on different lines. The process buildings were laid out alongside the main avenues which run east-west, and were arranged so that extensions ran either north or south.

The present factory has been constructed on north and south sites divided by a new public road running from the main Stockton-West Hartlepool road eastwards to Port Clarence. On the north site are manufactured the nitrogen products and on the south site the alkali products. The cement works are at the north-east corner and also near the river bank, where facilities exist for handling the finished product and passing it to the main railways or seagoing vessels. The lay-out of the electrical distribution scheme has followed the growth of the factory, *i.e.*, the unit method, and falls naturally into three systems, corresponding to three stages of development.

System "A."

In the first place, we have the initial supply at 11,500 volts, 40 cycles, from the North Tees power station of the Newcastle-upon-Tyne Electric Supply Co. This supply is taken from a subsidiary board at the power station to the East Sub-station, which is adjacent to the process building, by four feeders with Merz-Price and overload protection; these cables are buried for the greater part of their route length and are controlled by cellular-type switches. The transformer units are of the indoor type with bare-copper connections to an a.c. flat-back switchboard, consisting of forty-two panels, ranging in size from 300 to 800 amperes.

The heater load on this system is direct current and is supplied through three 550-kW rotary convertors. A "stand-by" lighting supply can be obtained from a petrol-driven generator, which is arranged to start up automatically when the voltage of the supply from the power company drops to a predetermined value.

System "B."

With the development of the factory over a wider area, it became necessary to take an additional supply from N.E.S. Co. This supply was taken direct from the 11,500-volt busbars through two main switches, on a double-ring transmission system with three main sub-stations in circuit. Two further sub-stations were fed by means of parallel feeders from these main sub-stations, and interconnection made with the existing N.E.S. Co.

* The Steam and Electric Power Plant of Imperial Chemical Industries Ltd., at Billingham, by H. A. Humphrey, D. M. Buist, J. W. Bansall; I.E.E. *Journal*, October, 1930, and ELEC. REV. March 21st, 1930.

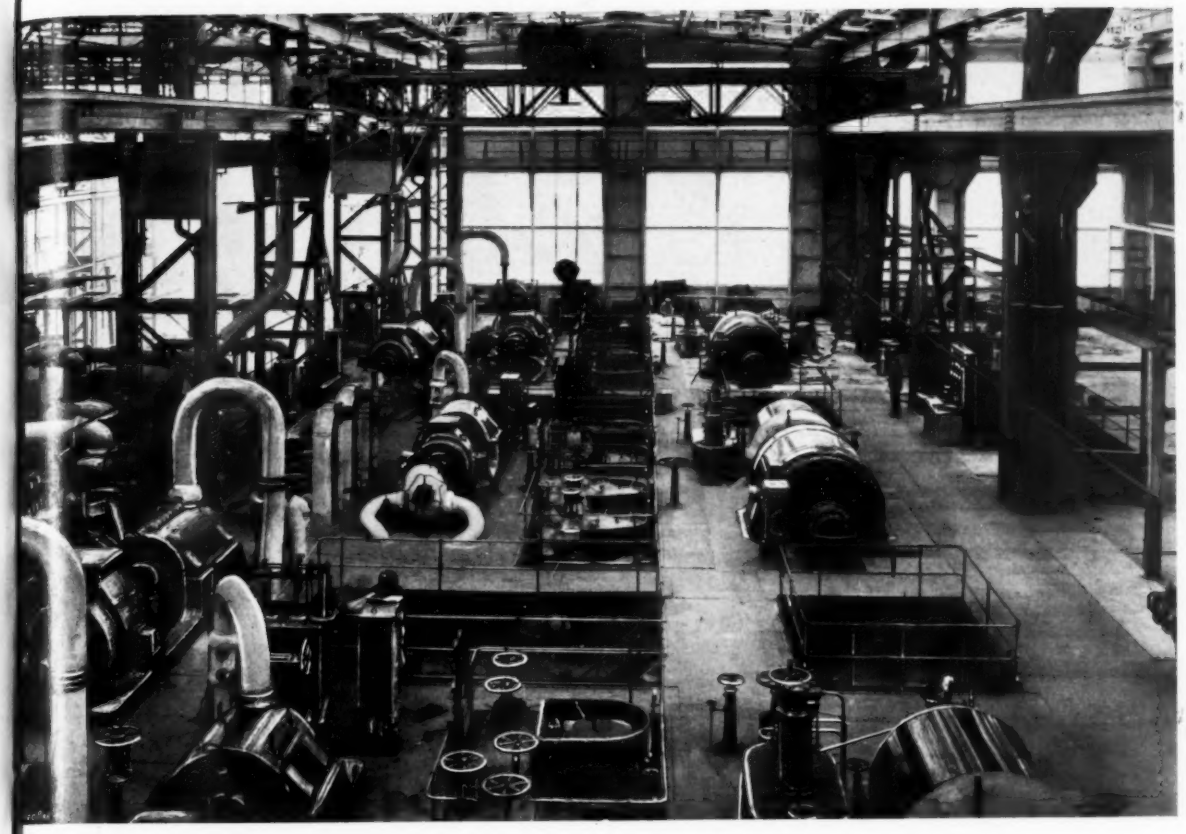


Fig. 2.—Bay in Engine Room; Feed-heating Sets and High-pressure Pumps.

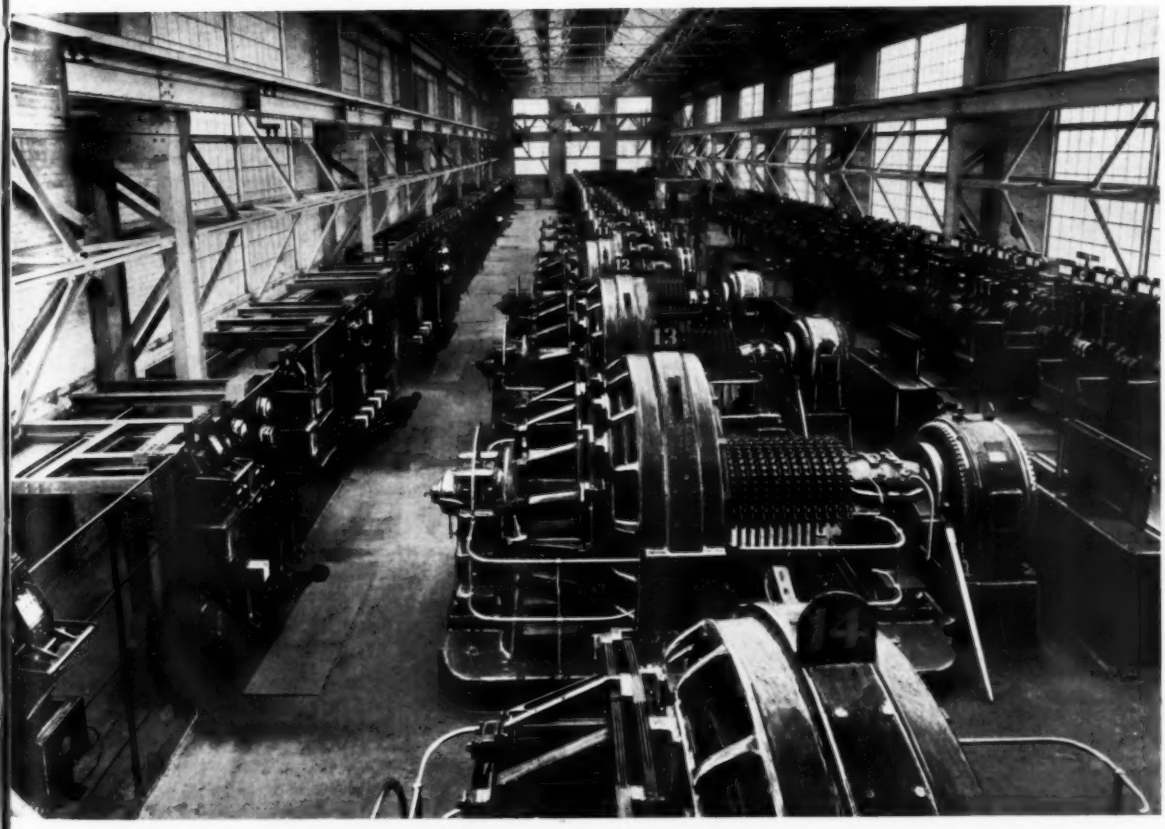


Fig. 3.—General Arrangement of 20,000-kW Rotary-convertor Sub-station.

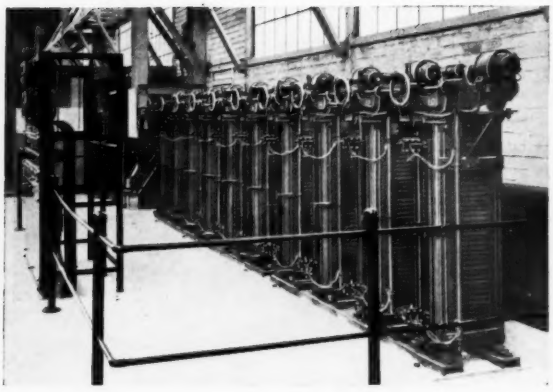


Fig. 4.—Gang-operated Rheostats.

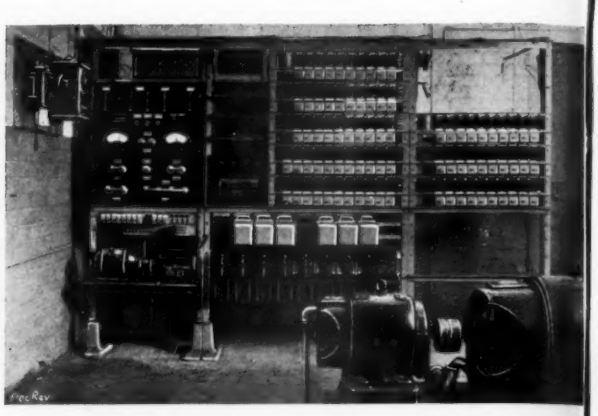


Fig. 5.—Automatic Telephone Exchange.

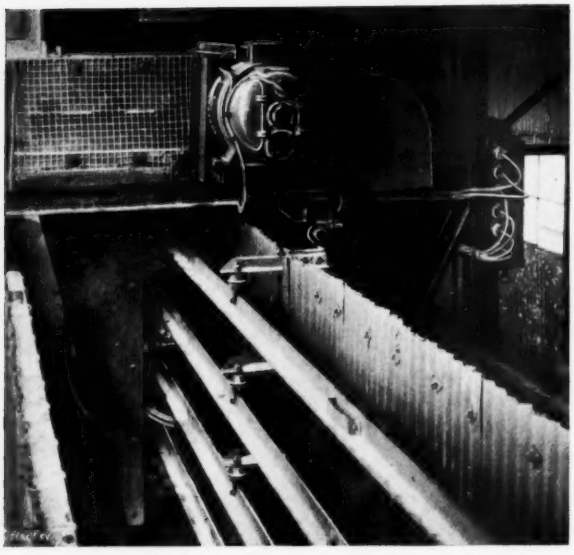


Fig. 6.—Apron Feeder and T-section Conductors.

Fig. 7.—Interior of System " B " Sub-station.

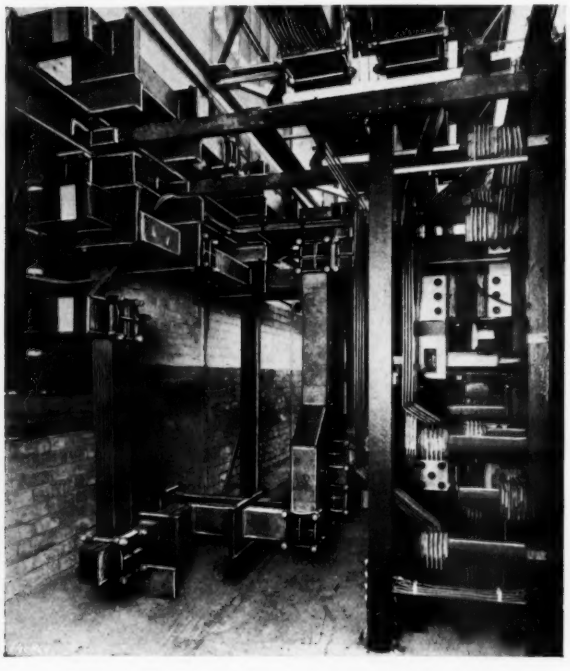


Fig. 8.—D.C. Feeders in Rotary Sub-station.

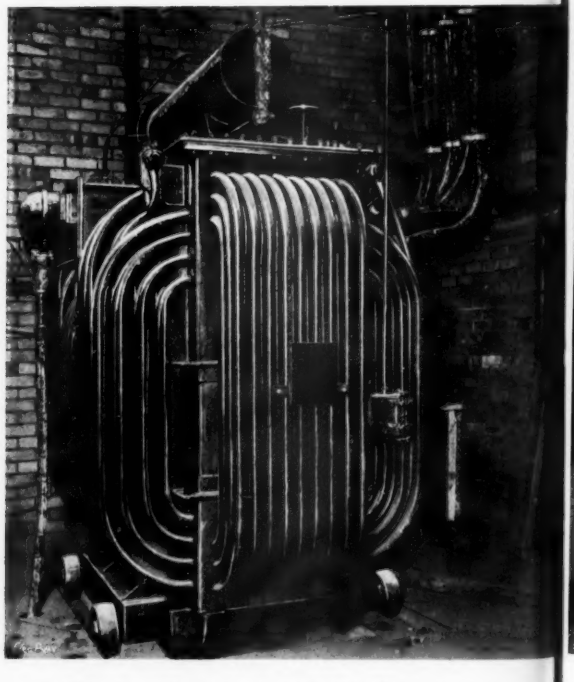


Fig. 9.—Standard 1,500-kVA Transformer.

Fig. 10.—Sub-station under Cable Bridge.

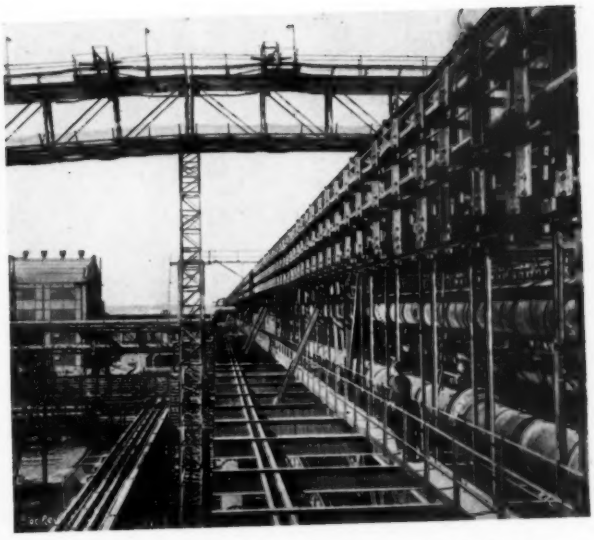


Fig. 11.—Trestle Bridge Supporting Cables.

Fig. 12.—Transformers with Protective Gear.

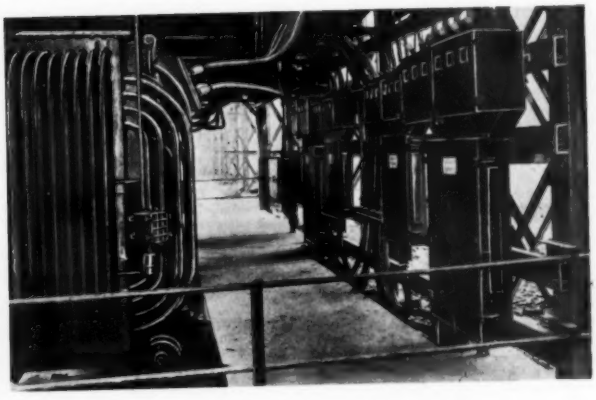


Fig. 13.—Arrangement of L.P. Fuses.

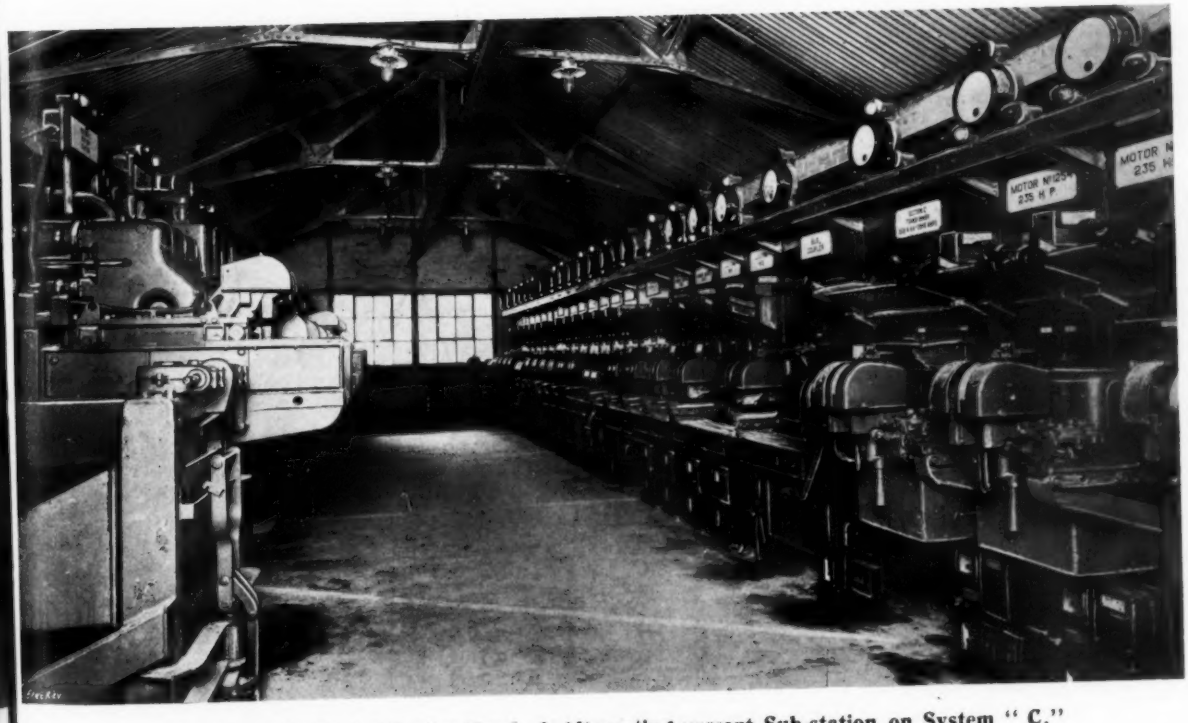


Fig. 14.—Interior of Latest Type of Alternating-current Sub-station on System "C."

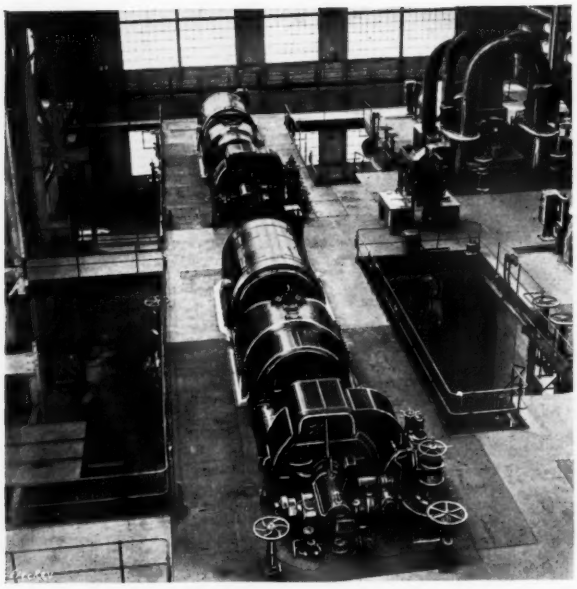


Fig. 15.—Primary and Condensing Turbines.

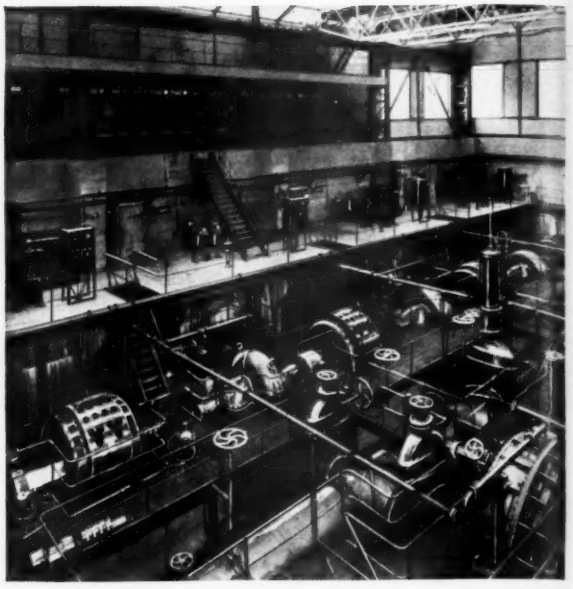


Fig. 16.—Pump Motors, 2,200 h.p., 6,600 Volts.

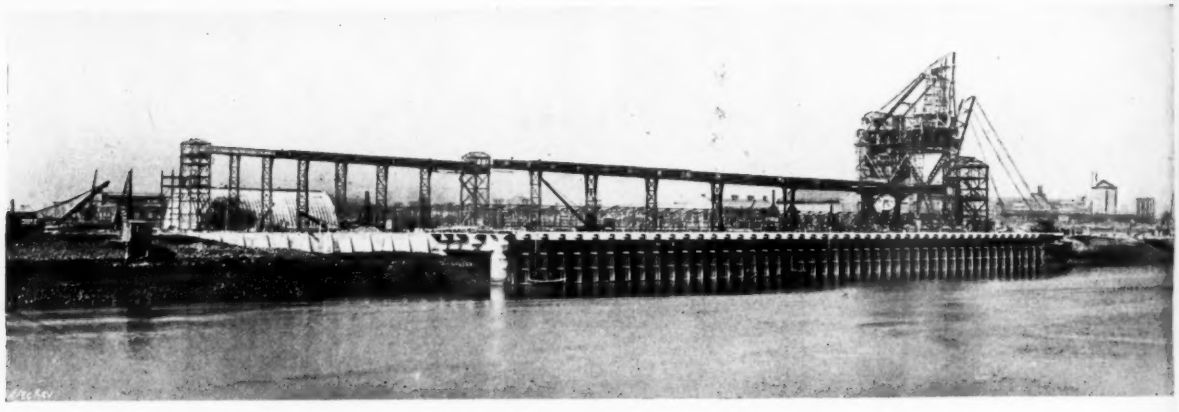


Fig. 17.—Billingham Reach Wharf with Produce Transporter and Conveyors.

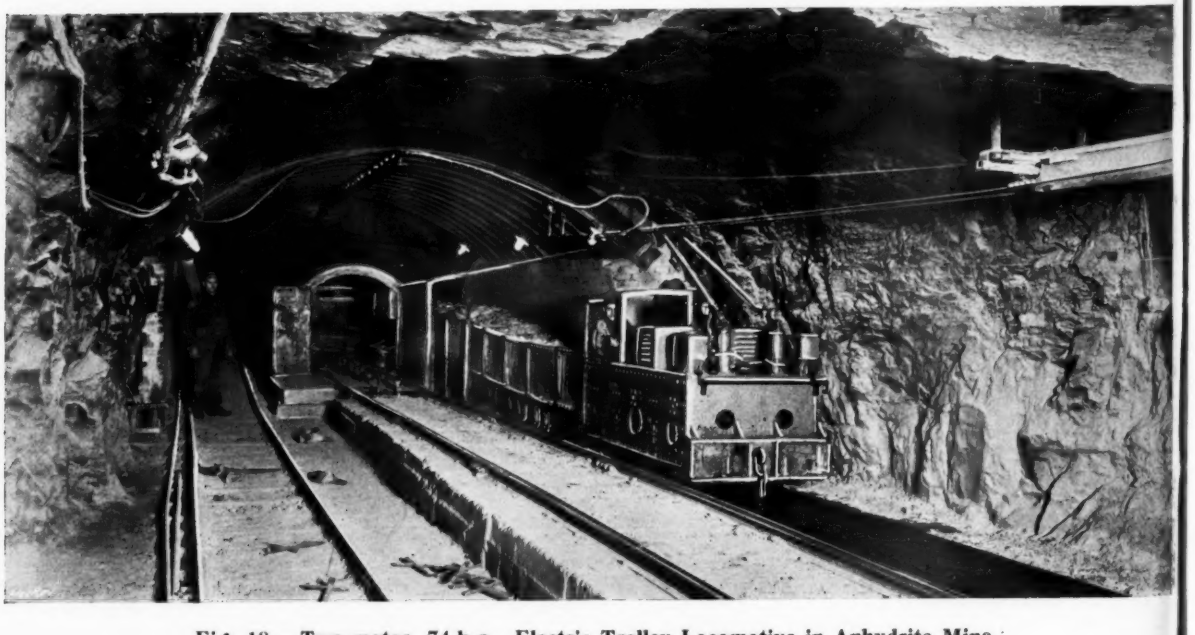


Fig. 18.—Two-motor, 74-h.p., Electric Trolley Locomotive in Anhydrite Mine.

system, *via* the East Sub-station. The four feeders from the reactance house are so arranged as to give the facilities of two complete ring systems, with a main switch controlling each ring (see fig. 20).

The e.h.p. feeders from North Tees to the reactance house have Merz-Price protection, whilst the ring main feeders beyond the reactance house have opposed-voltage protection with biasing transformers. The transformer protective gear is of the circulating type with biasing transformers. Overload protection on feeders and transformer circuits is provided by three trip coils mounted on the breaker mechanism shunted by time-limit fuses. The protective current transformers for the feeders between the reactance house and North Tees and between the reactance house and the Grange and Central Sub-stations are so arranged as to place the reactors in the overlap protected zone. One of the pump houses is supplied from this network and the 1,800-h.p. motors are remote push-button controlled, the stator switch being housed in the sub-station.

A 2,000-kW turbo-alternator (for feed heating or condenser conditions, according to process steam requirements) runs normally in parallel with the 400-volt system on this network, but is so connected that, in the event of the failure of the bulk supply, it will feed the emergency motors which keep the chemical conditions in the factory in a safe state.

Improvements and developments in process plant were rapid and continuous and so caused delay in settling the ultimate load requirements, and, in view of the necessity for a supply to be available at the scheduled date, the most practicable course was to bring out main l.p. feeders only from the sub-stations. Thus it was that a few large drives, ranging from 800 to 1,200 h.p., were installed for operation at 400 volts, and this involved the erection of l.p. switch houses, from which cables were led direct to the stators in the works buildings—often an appreciable distance. Economy was effected by the adoption of remote control of the switches in these circuits.

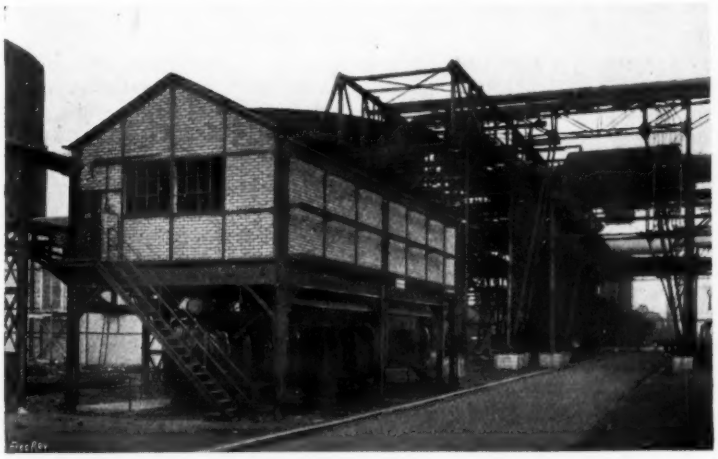


Fig. 19.—Exterior of Sub-station on System " C."

The type of sub-station employed is shown in fig. 7, and a novel feature is introduced in the white lines, shown on the floor of the operating passage common to the e.h.p. and l.p. switch controls, which indicate to the operator the respective e.h.p. and l.p. transformer switches controlling each unit. Another help to the switch-man is the small inspection window fixed below the label on each of the l.p. remote-control panels to ensure that when isolating a switch the operation is carried out on the correct panel.

The e.h.p. gear is of the compound-filled metal-clad duplicate-busbar type, with oil-immersed selectors, and has a rupturing capacity of 250,000 kVA. The 1,200-A l.p. gear is of the air-insulated duplicate-busbar type with remote-control panels and has a rupturing capacity of 40,000 kVA. The transformers are 2,000-kVA units of the outdoor type.

System " C."

The latest extensions to the process plant, which were started in 1928, demanded a large amount of process steam, and this requirement, coupled with the great increase in electrical load, resulted in the erection of a power station within the works.

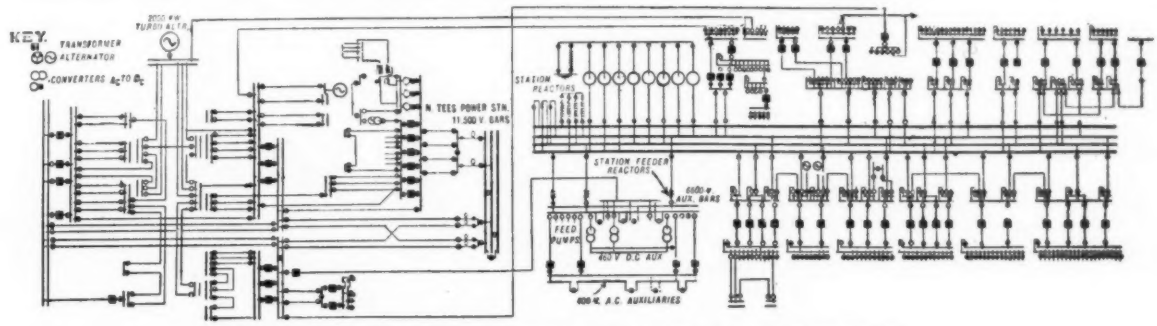


Fig. 20.—Diagrammatic Scheme of Electrical Distribution System.

The sub-stations on system " C " are fed direct at 6,600 V, 40 cycles, by three sectional feeders from the power station bars and interconnected in groups of three. Where interconnection is not made, an additional feeder from the power station is installed. Merz-Price and overload protection is provided on all feeders and inter-

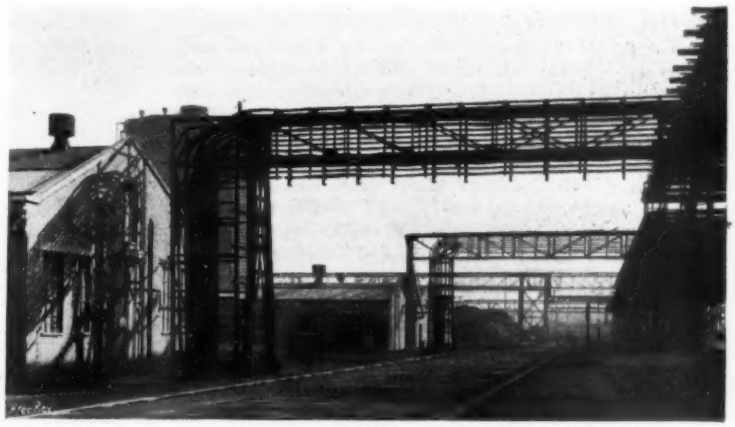


Fig. 21.—Exterior of Old Type of Sub-station.

connectors, with the exception of those to the Alkali Sub-station. The load on this sub-station demanded parallel feeders, and this condition enabled " split-conductor " protection to be adopted, thus eliminating the cost of pilot cables. The transformer protection consists of overload and earth leakage on the e.h.p. side with balanced earth leakage on the l.p. side.

The whole of the sub-stations are in telephone communication with the North Tees power station and the I.C.I. Billingham power station, *via* telephone cores laid up with the pilots. The automatic board controlling these circuits is indicated in fig. 5. This system is quite separate from the main factory 1,000-line, 4 digit, A.T.M. automatic exchange installed at the main office.

As a result of experience gained while carrying out the previous extension, and also because a clearer estimate of the electrical requirements of the individual plants could be made, it was decided to combine each switch house and sub-station in one building. The saving effected by the later design of sub-station can be readily judged when comparing figs. 13 and 19 with fig. 21.

Figs. 13 and 19 show the exterior of a system " C " sub-station, with the transformers and fuseboards housed under the switchgear floor, while fig. 21 shows the main sub-station of the old type in the foreground containing panels of 1,000-A minimum capacity with the outgoing l.p. cables feeding a switch house in the middle distance, which contains the smaller circuit breakers and fuseboards. The new design was facilitated by the employment of 6,600-V motors wherever possible. The e.h.p. gear is of the compound-filled metal-clad duplicate-busbar type, with a rupturing capacity of 350,000 kVA. The l.p. gear is of the draw-out ironclad air-insulated duplicate-busbar type, with air-insulated busbar selectors, and has a rupturing capacity of 50,000 kVA. A typical arrangement for the switchgear is shown in fig. 14.

Pipe bridges running along the main avenues (fig. 11) were erected to take the gas, water, and steam mains, and specially designed hangers for the electric cables were embodied. The branch bridges running north and south from these main avenues also incorporated similar supports, so that all e.h.p., pilot, and l.p. cables are at all times visible. The bridges are of the trestle type with intervening spans of 50 ft. to 250 ft., and it was very early apparent that the most suitable sites for 6,600-volt sub-stations in nearly all cases would be in the vicinity of the branch cable bridges. The sub-stations were therefore so designed that they could be accommodated immediately below the bridges, thus utilising sites which would otherwise be useless (see fig. 10), and allowing the loop-in of feeder cables at a minimum distance from the main route.

Economy in E.h.p. Switchgear.

The current practice of eliminating all unnecessary switchgear has been followed and an example of the saving in cost thereby effected is furnished on the south site of the works, where a running load of from 1,400 to 1,600 kW is grouped 600 yards from the main sub-station.

A l.p. supply to this area, which contains vital process plant, would have been costly, and it was decided to supply the load from the main sub-station at 6,600 volts with step-down transformers situated at a central point in the factory. In view of the importance of the process two e.h.p. feeders (each capable of carrying the load) are each connected direct to a 1,500-kVA transformer. The l.p. side of the transformer is controlled by an oil switch adjacent to the outgoing l.p. feeder panel and housed in a building alongside the transformer raft. Full protection on the e.h.p. feeders and transformers is afforded by fitting the two sets of protective current transformers in a special housing on the e.h.p. side of the transformer. The secondary connections on the current transformers are brought to a terminal board and the main e.h.p. dividing box is fitted to the base of the current-transformer chamber. A Merz-Price feeder protective relay is fitted on the l.p. transformer panel and also on the e.h.p. feeder panel in the main sub-station. The transformer protective relay is fitted on the l.p. transformer switch and, by means of the telephone pair laid up in the pilot cable, operates a d.c. tripping relay in the main sub-station. The additional equipment on the e.h.p. side of the transformer is shown on fig. 12; this should be compared with the normal unit shown in fig. 9.

6,600-Volt Motors.

Fig. 16 illustrates one of the two pump-houses supplying cooling water to the works. The installation comprises four 2,200-h.p., 6,600-volt, 3-phase, 480-r.p.m. slip-ring motors driving 36-in. " Lonovane " pumps, each capable of delivering 37,500 gallons per minute against a head of 105 ft., but arranged to take larger impellers at a later date.

Speed regulation on the motors is by means of water-cooled motor-operated liquid regulators, the control panels for which are shown mounted on the platform in line with each unit. The control panel also accommodates the remote-control switches for the motor-operated stator switches, the latter being mounted alongside the incoming and outgoing feeder panels and housed in the pump-house annexe. The l.p. switchgear is shown accommodated on the floor above the e.h.p. panels.

Water Cooling of Large Motors.

An efficient and economic design of cooler has been installed on 38 a.c. and d.c. motors ranging from 75 to 350 h.p. A cooling water supply is connected to radiators mounted directly on top of the casing. In some instances the water is supplied from the outlet of the power-station condenser circulating system, or, alternatively, when the temperature of the outlet water is too high, from the inlet. After passing through the radiators, the water is passed to the spray pumps of the flue-gas cleaning plant, and after use in the dedusters is discharged to the drains.

The equipment has proved ideal for motors installed in dusty atmospheres, and the following advantages over an air-cooling system are claimed:—

(1) Where motors are located in the centre of large buildings, such as a pulveriser plant, the difficult routes and erection of air ducts is eliminated.

(2) The absence of underground air ducts, which are high in first cost and difficult to keep free from drainage water, and of overhead air ducts, which occupy too much space in congested areas.

(3) During construction periods plant foundation work can be completed without awaiting settlement of ventilating schemes.

(4) The system needs much less attention than an arrangement of air filters installed under similar conditions.

(To be concluded.)

The contractors for the electrification of the S.A. & N. Works were as follows:—

CABLES (Paper Insulated): W. T. Henley's Telegraph Works Co., Ltd.

V.I.R.: British Insulated Cables, Ltd.; Macintosh Cable Co., Ltd.

E.H.P. AND MAIN L.P. SWITCHGEAR (Sub-stations): British Thomson-Houston Co., Ltd.; Metropolitan-Vickers Electrical Co., Ltd.; A. Reyrolle & Co., Ltd.

L.P. SWITCHGEAR (Switch-houses): George Ellison, Ltd.

TRANSFORMERS: British Electric Transformer Co., Ltd.; Brush Electrical Engineering Co., Ltd.; Ferranti, Ltd.; Metropolitan-Vickers Electrical Co., Ltd.

ROTARY CONVERTORS AND D.C. SWITCHGEAR: British Thomson-Houston Co., Ltd.; Metropolitan-Vickers Electrical Co., Ltd.

MOTORS: British Thomson-Houston Co., Ltd.; Crypto Electrical Co., Ltd.; Mather & Platt, Ltd.; Metropolitan-Vickers Electrical Co., Ltd.

MOTOR-CONTROL GEAR AND CONTACTORS: Allen West & Co., Ltd.; British Thomson-Houston Co., Ltd.; Brookhirst Switchgear, Ltd.; Electric Control, Ltd.; George Ellison, Ltd.; Igranic Electric Co., Ltd.; Metropolitan-Vickers Electrical Co., Ltd.; Watford Electric & Manufacturing Co., Ltd.; Witton-Kramer Electric Tool & Hoist Works, Ltd.; Electro-Mechanical Brake Co.

FUSEBOARDS: Artic Fuse & Engineering Co., Ltd.; Revo Electric Co., Ltd.; Parmiter, Hope & Sugden, Ltd.

INDUCTION REGULATORS AND ELECTRIC LOCOMOTIVE: English Electric Co., Ltd.

Small Push-bar Switches.

A Discussion of Some of the Mechanical and Electrical Features of their Design.

By L. G. H. SARSFIELD, M.Sc., M.I.E.E., A.Inst.P.

THE ever-increasing demand for electrical apparatus in the spheres of lighting, heating, and domestic power is being followed by what might be termed "finesse" in control features. We are, for instance, using a lampholder switch instead of an independent tumbler switch mounted on the lamp standard, a pear switch to avoid walking to a wall switch, and a two-way centre "off" switch instead of a combination of two switches.

There is thus a demand for small switches capable of dealing with currents of, say, up to 1 ampere at domestic voltages which are at once modest in dimensions, efficient in operation, and attractive, if not unobtrusive, in appearance. The danger of a reduction of dimensions is the tendency to sacrifice the mechanical strength of the moving parts and to limit electrical clearance, but careful design and sound workmanship can produce many small fittings in which due regard is paid to all essentials.

Although a switch is required to carry a current when the circuit is closed, its main function is to open and close the circuit, and it must therefore withstand the conditions produced by those operations. The contacts should be sufficiently robust to withstand, without undue damage, the sparking at "make" and the possible arcing at "break." In double-pole switches, of course, the breaking arcs must never cause a short circuit of the line.

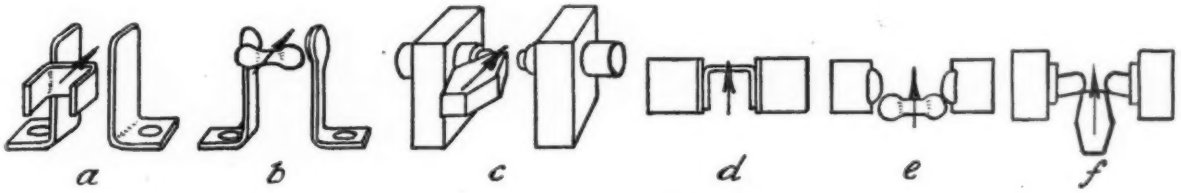


Fig. 1.—Types of Switch-closing Contacts.

Making the Circuit.—Sparking at "make" often results from an uncertain approach to one another of the contacts which complete the circuit. For this reason one of the earliest and simplest lessons learnt in the manipulation of switchgear is to throw in a knife-switch with vigour and determination.

The operation of closing the circuit in small single-pole switches for domestic use is generally the insertion of a stirrup, bar, or wedge of conducting material between two contacts, as shown in the perspective views as fig. 1, *a*, *b*, *c*, *d*, *e*, *f*. In still another type the common knife switch is reproduced in miniature, and unfortunately on very inferior lines. For double-pole models two conducting members are used, suitably separated to accommodate the voltage between them. In the majority of cases the push bar works toggle mechanism which governs the movement of the actual contacts.

Springs are often used to give sharp movement so as to effect a "clean make." When such a course is adopted it is necessary to exercise great care to ensure that the remedy for one trouble does not introduce another.

In a lampholder switch, or pendant switch, of the push-bar type the contacts are sometimes so light, or so badly secured, that they vibrate, due to the impact of the moving member, especially when the latter is actuated by a spring. A remarkable example of this was found in a rather unusual pendant model of Continental origin examined by the author. In this design the circuit is closed by a single-leaf contact meeting a similar leaf "head on," and the spring-driven moving member gives the fixed one such a blow that it suffers badly from vibration. A noticeable rebound occurs, which is responsible for sparking that is greater than that which is normally present at "break." Pear switches of this type are on the market at the present time.

When leaf contacts are used for small switches (see fig. 1 *b*) they are often of necessity constructed of light material, because of the restricted space available. The electrical conductivity of the leaves may be adequate for the current they have to carry and, if there is good contact, they will function satisfactorily; but they are liable to get out of adjustment. The consequence is that alignment is upset, pressure becomes uneven on the two sides, one leaf makes or breaks circuit before the other, and so on. This condition is illustrated in the plan view fig. 1 *e*.

Even and sufficient pressure at the contacts is obviously important. An attempt is made to meet the need for contact pressure in the model shown in fig. 1 *c*, which is often used. The conducting member is inserted between two spring plungers by a spring-accelerated movement in a direction at right angles to the line along which the plungers travel under the influence of the springs they contain. The arrangement leaves room for criticism on the score of the serious risk of jamming. This result is illustrated in plan view fig. 1 *f*, which demonstrates the need for accurate construction and assembly. Where this arrangement is used the plungers should have adequate support in the sleeves when fully extended, and the conducting member should strike them at their radiused ends where it is possible for components of the striking force to push both plungers into their respective sleeves. This kind of movement calls almost for instrument fitting if it is to be reliable.

It is difficult enough to find room in a single-pole pear switch, and still more so in a double-pole lampholder switch, for parts robust enough to withstand the violence of spring operation.

Such small switches, however, provide an attractive sphere for the application of the new multifold spring contacts due to Mr. H. Garde and recently discussed from the experimental and operating point of view by the author in an article on lampholder design.* This type of contact consists of a phosphor-bronze strip formed into a multifold compression spring (see fig. 2 *a*) having large surface, high conductivity, mechanical strength, and flexibility. The last-mentioned property permits normal pressure on the contact faces almost independent of alignment.

* ELEC. REV. March 22nd, 1929.

The general principle of the switch is as shown in the perspective views, fig. 2 *b* and *c*, representing a single-pole unit in the "on" and "off" positions, respectively. In the figure A is an insulating bar carrying the conducting member B, which short circuits two multifold spring contacts DD. Components can be arranged for single-pole, two-way, or double-pole working with equal simplicity. In the two-way and double-pole units the push bar is fitted with two conducting members appropriately spaced apart.

The conducting member is flush with the insulating material of the bar and the contact springs therefore exert an even pressure on the bar, whatever its position may be; also the springs have the support of the walls of the slots in which they lie. The conducting member slides easily into position with a movement which, though quick enough, avoids mechanical shock and consequent vibration. The multifold spring contacts give really reliable pressure, which is essential in a butt joint which must have good thermal and electrical conductivities. The actual contact area has behind it a generous body of material for conducting away any heat generated. The importance of this in connection with the cool operation of the switch when closed cannot be too strongly emphasised. The carrying capacity of the springs is high. Reliability runs at 9 amperes continuously on these contacts when fitted in lampholders were described in the article previously referred to.

Breaking the Circuit.—Current-breaking capacity is the ultimate test of a switch, and the multifold spring-contact model shows up well on this duty, although it is not assisted by quick-break accessories.

Speed of breaking the circuit is a feature much advocated in connection with switches and breakers of many kinds, and its advantages are important for (1) isolating a faulty line in the least possible time, so as to minimise damage to the line and generator; (2) reducing the risk of a destructive arc actually on the switch at the severance of contacts carrying large currents. In the case of small single-pole switches the first demand is very rare, and in connection with the second large currents are not involved. Destructive sparking may, however, be avoided by means other than the mere provision of spring action to speed up movement. There has been a tendency for small-switch designers to concentrate upon quick action at the expense of other electrical characteristics. The fitting of springs generally necessitates screwed, or riveted, parts, which may become loose and so endanger good contact and therefore develop heat; also the complication of a number of small parts is undesirable when space is so limited, especially in the case of double-pole movements.

On the other hand, simplicity of design and operation are valuable features, and are secured by the multifold spring-contact switch as previously shown. Moreover, the switch has a decisive action and positive arrest at the end of its travel. The bar carrying the conducting member is shaped with slightly inclined planes (the inclination is exaggerated in fig. 2 *b* and *c*) at the centre, so that as it moves from "off" to "on," or *vice versa*, its portion of maximum width passes between the contacts and the bar therefore slides smartly into position. As the thumb pushes the bar in either direction the register of position is unmistakably felt and it has a pleasing effect from the point of view of manipulation. The pronounced "click" accompanying the operation of some types of push-bar switch gives the impression of efficient mechanical movement. Some of the facts already stated make it clear that this is not necessarily the criterion of good electrical performance. A spring-driven conducting member is certainly not essential, and in some cases is definitely menacing to the best operation of a small push-bar switch.

Regarding the actual break of the circuit, it is the author's view that the quality of the contact when the circuit is closed and the arrangement of the conducting material immediately back of the contact surfaces govern to a considerable extent the breaking conditions. If the switch when closed gives cool operation, any heat generated at break will obviously result in less ultimate temperature than if the switch were hot before the break occurred. Also the very properties of the switch which allow cool operation when closed permit the rapid conduction away of heat generated at break.

A large number of tests on the multifold spring-contact switch testify to its reliability as well as its current-carrying and breaking capacities. Three samples of the standard size of push-bar unit having 8-fold springs of 0.2-in. by 0.01-in. strip were submitted to Faraday House, London, and were operated on a 250-volt d.c. circuit controlling a non-inductive load. Current was increased in steps of 0.5 ampere until the switch failed to break the circuit. Each switch was operated four times at each successive increase of current. Two samples failed at 3.5 amperes and the third at 5.5 amperes. Three other samples of small size having 6-fold springs of 0.15-in. by 0.01-in. strip were tested under similar conditions with 0.25-ampere steps. Two failed at 1.25 amperes and one at 1.5 amperes.

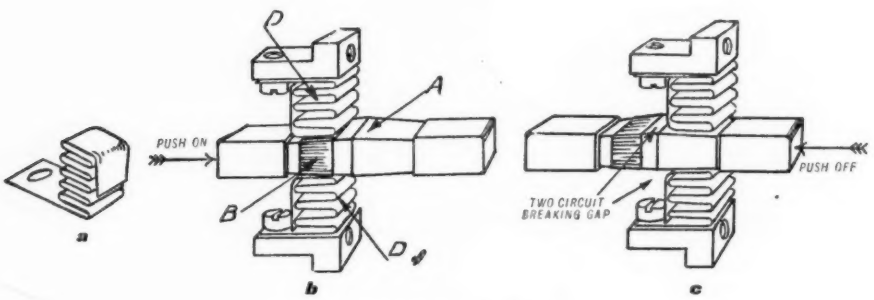


Fig. 2.—Spring Switch Contacts.

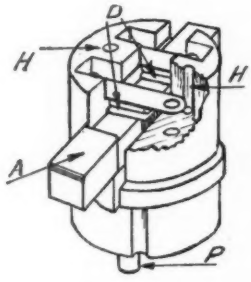


Fig. 3.—Switch Lampholder.

During the author's observations of over-voltage conditions a small (110-watt) switch made and broke 100 times consecutively 1 ampere at 330 volts a.c. with negligible sparking. In the case of an ordinary domestic lamp load of 180 watts also under observation, neither the switch nor the leads at the connections to it showed any sign whatever of deterioration after three years regular daily use. The satisfactory behaviour of over half a million of the switches in general domestic service is not without significance.

The fact that in the multifold spring-contact switch the conducting member is flush with the insulating bar on which it is mounted calls for some comment. It has already been stated that the flush arrangement aids even movement of the push-bar. The very small sparking present at ordinary loads has not been found to cause any appreciable burning of the insulating material. The circuit is broken by means of two gaps in series per pole, which can be seen in the single-pole switch represented in fig. 2 *c*. The gaps are opened simultaneously (the word "simultaneously" being employed in the comparative sense). The approximation to simultaneous action of the two sides of the conducting member is closer with the multifold push-bar arrangement than is possible with the average complicated spring-actuated toggle

mechanism, because of the essential simplicity of the former. The distance travelled by the push-bar is 0.25 in. and in a double-pole switch the total gap opening the circuit is 0.25 in. This distance may appear to be small, but it is adequate for the power with which the switch has to deal, say a maximum of 220 watts.

For two-way working three multifold contacts are used, one above and two below the push-bar, the upper one situated midway between the lower two. The short-circuiting member is sufficiently long to connect the upper contact to one or other of the lower ones, according to the position of the push-bar.

Fig. 3 shows a switch lampholder with the casing removed. The solid plungers P are at the bottom (one only visible) while the push-bar A and the multifold springs D can be seen at the top. Each multifold spring is in one piece with a horizontal cross bar, which is used for securing purposes, having two holes for screws to pass through the body of the china. One screw of each bar enters a terminal at its lower end. The leads pass through holes HH to the terminals below. An insulating cap is fixed to cover in the whole of the top.

Rating of Small Switches.—The rating of push-bar switches should have official attention. Other models are known as 5-ampere, 10-ampere switches, &c., and are specified for definite voltages. The push-bar switch is an important piece of low-current control apparatus which should be recognised and in some way standardised as to rating. The author would suggest that it be rated at, say, 1 ampere and 220 volts and be capable of breaking 100 per cent. overload at 50 per cent. over-voltage on test.

The multifold spring contacts are applicable to tumbler switches, and for this purpose each multifold contact is best mounted in a square slot covered with a plate which serves as a guide for the spring and a terminal post for connection. A small radius on the conducting member gives it sufficient " lead " to provide a smooth action at make and break.

In order not to obscure the more important matters relating to the conducting and circuit-breaking components of switches the subject of casings and bodies has not been introduced into this article, but fortunately these are days of improved pottery products and excellent mouldings in suitable materials.

Conclusions.—In the foregoing the importance of simplicity in small-switch design is reviewed and the need for reliable pressure and high conductivity at the contacts is emphasised. Some of the dangers of flimsy quick-break mechanisms are mentioned. The successful application of multifold spring contacts to small push-bar switches is demonstrated and some details of their arrangement and test are given.

The First Essential.

What makes a successful Contractor? The author discusses how, and by whom, inquiries are obtained, dealt with, and converted into orders.

By H. R. TAUNTON.

(*Concluded from page* 946.)

The Indoor Sales Organisation.

Before discussing the business-getting methods available to the indoor organisation, it is worth while giving a word or two to the possibilities of shows and trade exhibitions. In the provinces, particularly, where perhaps there may in the year be half-a-dozen agricultural or similar shows within an easy radius of a contractor's office, they may be made a fruitful source of inquiries and direct sales. They are, however, costly, what with rentals and travelling and other expenses; and though the equipment, if suitably designed, can be re-used, the unsold show stock rapidly deteriorates. It is advisable to keep careful record of all results, direct and indirect, to decide how far it is worth while to repeat the venture.

On such occasions it is usually a case of all hands on deck, representatives and salesmen being supplemented by members of the indoor staff. They should be temporarily put on similar commission terms to the selling staff, or at least given some form of bonus which will act as an incentive.

The mention of salesmen brings us to the subject of the indoor sales organisation. Salesmen (or saleswomen) in contracting firms who run a shop or showroom are usually juniors, but if their work justifies a whole-time appointment they should be as carefully selected as a canvasser, and they should have similar qualifications. At least, they should have sufficient technical knowledge of the goods they are handling to be able to talk about them with the confidence which inspires confidence. In far too many cases they are ignorant stores boys or junior clerks, lacking in every virtue of a salesman, even elementary courtesy. It is well to encourage what virtues they have by some form of remuneration dependent upon the results that they achieve.

Advertising Methods.

Coming now to the more indirect methods open to the office staff, the most obvious is, of course, advertising. That opens up a very big question, too important for discussion as a sub-heading. It also opens up the question whether, and how far, it pays an electrical contractor to advertise at all, in the narrower sense of Press and postal publicity.

A contractor's appeal must be to the general public, and to those professional classes—architects and consultants and the like—who act as its advisers. It is no use, therefore, his advertising in the technical and trade Press, as a manufacturer would do. It is not much use his advertising in architectural and building papers, as his return will be too limited in proportion to his expenditure. In any case his money would be better spent in the more direct and personal appeal of a representative. There remains the appeal to the general public, and this may be either in national or local papers. A few firms specialising in country-house plants advertise regularly in some of the society papers, and they presumably find that it pays them, though probably hardly so much to-day as in earlier years. For the general contractor, however, the only Press publicity worth considering is that of the local paper—and even that is not open to those in the London area. The cost is less, and the appeal is to a definite circle of neighbours. It serves, when the time comes, to keep his name in the memory of a potential customer, though he may never be able to trace to it with certainty any particular inquiry.

Indeed, this particular class of Press publicity is in

practice the only one that most contractors can afford. Advertising in newspapers or periodicals addressed to the general public is useless unless it is extensive and continuous—which for most means a prohibitive cost—and sporadic " campaigns " are a mere waste of money.

Very much the same applies to postal advertising by means of circulars. Only a profitable, quick-selling speciality justifies the heavy expenditure of anything like a national distribution. Even a selected local mailing list will involve a cost in printing, stationery, clerical work and postage which is rarely returned by results. The most economical form of circularising, although necessarily more limited in its scope, is by enclosure with current correspondence. Many suitable leaflets are obtainable from manufacturers, overprinted, without cost.

On the whole, then, it will probably be agreed that Press and postal advertising as a means of obtaining orders will not give an adequate return to the general contractor unless he has some speciality to offer. He is always confronted by the same handicap when he wants to advertise: he has no special appeal to make which a thousand of his competitors have not also. And publicity without talking points is like a lamp without a filament—empty and valueless.

That is not to say that all advertising effort on the part of the contractor is futile. Somehow or other he must shout his name abroad if it is to be remembered when there are orders about. But there are plenty of more economical and, in his case, more effective, mediums than the Press and the post. (We are not here considering collective advertising designed to benefit the general body of electrical contractors, but only individual and competitive efforts.) An outside representative is in himself a form of advertising: so is good window dressing or a well-lighted showroom for those who have more than an office or store. Advertising—advertising that pulls in orders—may take a score of forms suited to the contractor's special needs. The best of them is a sound reputation for sound work.

Advertised Contracts.

An obvious means of obtaining orders, or at least the chance of them, open to any firm, is to apply for the specifications advertised from time to time in the Press. Discrimination is necessary, particularly as to locality: it would rarely be worth while for a Southampton firm to tender for a job in Aberdeen. Moreover, the competition in these advertised tenders is always very keen, not to say reckless. Except in special cases, most firms who can secure their turnover by more exclusive methods prefer to ignore these published invitations to cut each other's throats.

Something similar applies to the specifications issued by the Post Office and other Government departments, and by such official bodies as the London County Council. The names of certain firms reappear at intervals as successful tenderers, so that apparently it is possible occasionally to secure a fair price and a profit. For that and other reasons most contractors are glad to have their names enrolled on the official lists. Usually, however, the competition is so keen, and often erratic, that it is doubtful whether the heavy labour incurred by the estimating department is worth the assumed privilege. A firm on the Post Office list may receive a lengthy specification thirty or forty times in a year, and be lucky if it receives a single order as the result of its tendering; luckier still if it makes a profit. A case such as that recently published, in which the lowest and successful competitor, of about a score, for an L.C.C. job secured the order at a figure something like 40 per cent., or £800, below the L.C.C. engineer's own estimate, acts as a deterrent to many of the busier firms.

Building-news and various trade-advice agencies are other possible sources of inquiries, but, generally speaking, they are of little value. If a contractor could have their information exclusively—which naturally he can't—it would be another matter; but its publication broadcast results in a competition so furious that there are usually no survivors. Somebody, of course, must get the contracts advised; but by the time the first hint of them gets into print, the order, in ninety-nine cases out of a hundred, is practically in the pocket of some firm with local knowledge and influence.

Not a doubt of it, the most and best orders come to the contractor who works quietly along his own lines without unnecessary publicity or fanfare of trumpets to waken his competitors. Shunning the blaze of the market-place, the frenzy of the " open tender," he is the more likely to meet that shy and elusive bird, the Purchaser, who seldom shouts his coming in the advertisement columns. A favour from a friendly architect, an introduction from a satisfied customer, a tip or a pulling of strings by some social acquaintance: so are won the orders which are really worth the winning.

Even so, it is rarely that Crœsus walks into an office and staggers a contractor with an open order. Few orders are landed without long playing with a patient and systematic rod. The fat contract commonly germinates as a more or less dubious " inquiry," and a discussion on the obtaining of orders is really one on the obtaining and systematic following up of inquiries. First catch your hare—your " prospect."

The Use of Card Indices.

To ensure that no possibility is neglected of converting a prospect, however vague, into a profit, some definite system of recording and dealing with all inquiries is clearly an essential. For recording purposes, nothing is better than a card index. And because of its importance, this should be kept under the eye of the principal.

The usual 5 in. by 3 in. cards are a convenient size, thin enough for use on a typewriter. The top left corner should carry the name and the correspondence address, and the opposite corner, a date. The bottom left corner is suggested for the name of the architect, consultant, or other responsible person, if other than that of the actual prospect; and in the remaining corner can be recorded the source of the inquiry. The centre is left for particulars: the address, if different from the correspondence address, the class of job wanted, and any special notes that may be worth record.

Different coloured cards are useful to classify the inquiries geographically, the precise divisions depending on the character and range of the business. A large London firm, for instance, specialising in country-house work and large contracts all over the kingdom, might have different colours for London, the Home Counties, the West and South-West, the Midlands, Wales, the Northern Counties, Scotland and Ireland. Another London firm might need only one colour for provincial inquiries but several for various London districts.

On the back of the card should be recorded the dates and results, if any, of all calls or letters, with such brief reminders as " Call again end March " or " Spec. promised about 1st April."

The cards should, of course, be arranged alphabetically, preferably with the aid of tabs. They should be further classified in several sections with appropriate guide cards, according to their degree of probability or urgency. A suggested classification is " Quotations," " Special," " Probable," " Possible," " General," and " Off," covering the whole gamut from optimism to pessimism in six steps. Cards are moved from one section to another as the prospect indexed becomes more or less promising.

A " Special " inquiry would be one in which a quotation has actually been asked for, or one which has been definitely promised in the near future. Under the same heading would come any inquiry which requires particular or urgent following up. A " General " inquiry, on the other hand, would be one initiated by the firm itself from information received, perhaps from a newspaper paragraph, without attendant circumstances which would justify its being indexed under the " Probable " or " Possible," sectional headings which explain themselves.

When a " Special " inquiry has matured, the corresponding card, with a note of the essential figures, is moved to the " Quotations " section for intensive

following up. And when any inquiry has sunk to the "General" section (or never risen from it) and after due effort has yielded no result, it is moved to the "Off" section. That section, which has an unfortunate tendency to be the largest, should be periodically overhauled, and the absolutely hopeless cases—those, for instance, in which it is known the order has been placed elsewhere—can be weeded out. On the other hand, lapse of time may find new life in some of them, and they may begin again an upward course to the glory of "Quotations."

A secondary index on the same lines should be kept by the outside representative. It should contain duplicates of all the inquiries which have originated with him or been handed to him to deal with. It should be checked periodically by a principal against the main index. It is obviously important that that should contain a full and up-to-date record of every prospect being handled by the outside man.

It is desirable to keep all correspondence dealing with inquiries distinct from the general correspondence, and it is convenient to adopt some system which will tally with the card index. Thus there might be three alphabetical files for the "Probable," "Possible," and "General" inquiries, correspondence being moved from one to another in the same way as the cards. These files would always be "live" files, "duds" being removed to box files when the corresponding cards are relegated to the "Off" section.

Inquiries promoted to the "Special" class will require individual folders, to contain the increased mass of papers. These will form the basis of a contract file if an inquiry fructifies into an order. If it does not, the essential correspondence can be removed to the "Off" box files, and other papers, such as suppliers' tenders, can be destroyed. There is no point in cluttering up the office with them, as some do, who look upon all postal matter as sacrosanct. Even if by some chance the inquiry is resuscitated later, new prices from suppliers will invariably be needed.

Finally, the file tallying with the "Quotations" section of the card index is obviously the usual "Quotations" file kept by most firms, containing a record copy of every quotation sent out, in addition to the copy or copies kept in the individual contract files or "Special" inquiry folders.

The bulk of the correspondence in these inquiry files will consist of carbon copies of "follow-up" letters. In certain cases these letters will need to be specially written; but in many—for instance, in dealing with inquiries resulting from some advertising campaign—standardised letters for first, second, and subsequent follow-ups can be used, with economy of time and of mental wear and tear. Needless to say, however, the composition of the originals requires the greatest pains if they are to "pull," and bring in a reasonable percentage of results.

A certain system, too, is necessary in connection with the intervals at which inquiries are followed up. Commonsense and tact will dictate a nice medium between pestering and neglect in the case of quotations and special inquiries, having regard to the circumstances of each. With the other less definite inquiries a routine is not only possible but really essential to avoid any of them being overlooked, the card index being used as a daily reminder.

After the first letter, either initiating the inquiry or replying to one, a week's interval is not too short for the first follow-up. A second can be sent at another fortnight's interval, a third at, say, a month's, and another at, say, three months. Whether yet another is advisable at a still longer interval is a matter of discretion, but usually if there is no result from the first three follow-ups the inquiry may be considered as dead.

The same routine may be applied to calls, where calls are possible, and in either case will naturally be modified by circumstances.

To some, so much systematic card-indexing and letter-filing and following-up may seem an unnecessary complication added to a contractor's already arduous existence. Not so. No time or trouble, no elaboration of routine, can be too great that will ensure not only the obtaining of inquiries, but also the extraction from them of every possibility of an eventual order. No inquiries, no orders; no orders, no profits; no profits—*finis*!

Electricity for the Home.

Selections from Recently Introduced Apparatus.

A New Coffee Machine.

The "Express" coffee machine, fig. 1, is a recent introduction of Messrs. FALK, STADELMANN & CO., LTD., Veritas House, 83 to 93, Farringdon Road, E.C.1. It is claimed that coffee made with this machine retains its aroma and the alkaloid caffeine, essential as a stimulant on the circulatory and nervous systems, and acquires a flavour unknown to those accustomed only to prepare their coffee by old-fashioned methods. The machine is available in two sizes, ¾ pint and 2 pints, with loadings of 330 and 600 W, respectively. The dimensions of the smaller model are 9 in. high and 3¾ in. base diameter, and those of the larger model are 11 in. high by 4⅞ in. base diameter. The element is housed in the base of the machine and follows the usual mica-sandwich construction.

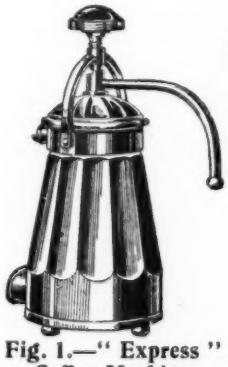
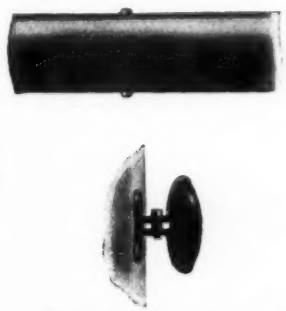


Fig. 1.—"Express" Coffee Machine.



Figs. 2 and 3.—Front and End Elevations of "Maxheat" Oval Heaters.

Oval Tubular Heaters.

"Maxheat" oval tubular heaters are a recent development of the WARDLE ENGINEERING CO., LTD., Old Trafford, Manchester. They present a much reduced projection, and offer a neat and unobtrusive appearance, figs. 2 and 3. The smooth face of the tube, unbroken by securing clips, ensures harmony with the background, while the rich brown finish tones with any scheme of decoration. The element comprises a high-grade nickel-chromium coil continuously supported throughout the entire length of the tube and designed to operate at black heat. The correctly designed steamline oval offers a minimum obstruction to the natural flow of air across the face of the tube, and as a result of the rapid transference of heat the operating temperature is very low. The supporting bracket is of novel design. With the tube in position in the grip a half turn of a screw locks the equipment in position, leaving the supporting

bracket of the oval tube practically invisible. The tubes are made in lengths up to and including 10 ft. with two fixing brackets, and in lengths from 11 ft. to 17 ft. with three fixing brackets. The standard outlet is ¾-in. conduit.

A Small Immersion Heater.

The latest production of Messrs. GEORGE GREEN & Co., "Gee-Gee" Works, Chapel Road, West Norwood, S.E.27, is the small liquid heater shown in fig. 4. The well-insulated element is encased in a copper tube which is finished with a heavy coat of silver, so that the heater may be safely used in any liquid for human consumption.

Fig. 4.—"Gee-Gee" Silver-plated Liquid Heater.

It is designed for use in almost any utensil in the home in which it is desirable to heat small quantities of liquid, the sheath merely being immersed in the contents. The loading is 500 W, and half-a-pint of water can be brought to the boil in about 3½ min. The heater is supplied packed in an attractive box with two yards of circular braided flexible lead and a b.c. adaptor.

New Electric Fires.

The following notes are based on the general specification for "Furnace" electric fires produced by the FURNACE ELECTRIC HEATING CO., LTD., 22a, Commercial Street, Halifax. The heating effect of a "Furnace" element is claimed to be unusually high, as the result of the specially-designed grooves of the fire-bar, the temperature at which the high-grade nichrome wire may be run with safety, and the position of the element itself in regard to the reflector. The "fire-bars" are of high-quality British refractory material, light but strong, on which is wound the spiral of specially-drawn nichrome wire. They are fitted by means of a patent taper connection which ensures perfect contact and renders the units instantly detachable from the fire. The element is easily detached and fitted, and is heat insulated from the rest of the fire, thus still further increasing the efficiency of the fire. There is no wiring, the connections being made by means of bolts straight through from the end of the element. Both poles being at one end, there are no live wires or rods of any kind crossing the fire itself. The connector provides an adequate cord-grip for the flexible lead, two yards of which is supplied. In addition, the "Furnace" patent "flex grip" is fitted, and effectively prevents any fraying of the braid on the flexible. The reflector is designed to throw the heat forward in a divergent beam, so that the heating effect is not restricted to a small area immediately in front of the fire. It is polished and lacquered with a special heat-resisting lacquer, which enables it to retain its high reflecting qualities. A selection from the range of fires of this make is the "Supreme" model shown in fig. 5. It is equipped with two 1,000-W elements, and is available in a variety of finishes.

Fig. 5.—"Supreme" 2-kW Fire.

Combined Fire and Fireplace.

The "Bell" all-electric faience and tile fireplace, fig. 6, produced by Messrs. A. BELL & Co., LTD., BELL RANGE & FOUNDRY CO., Kingswell Works, Northampton, represents an interesting and attractive departure from the usual domestic electrical heating apparatus. Original in design and construction, this fireplace incorporates an electric fire in an attractive setting obtainable in many beautiful colours and designs. The fire itself is built in with the tile mantel, which is in one unit ready for fixing, and in the type illustrated in fig. 6 the return ends of the mantel give complete cover to the interior fireparts; thus the whole fireplace can be fixed against a flat wall, no brickwork recess or flue being necessary. Convected as well as radiant heat is given, hot air rising at the back of the fire from the element bars being conveyed through the perforated faience ventilator into the room. The fireparts are instantly accessible, as the element bars, complete with the sub-frame on to which they are fitted, can be removed from the front of the fireplace within one minute, flexible heat-resisting asbestos-covered connections being used between the bars and switches to allow freedom of movement. "Tucker" foot-press switches fitted on the return end of the mantel operate two bars, the centre bar being directly controlled from the main switch. The mantel stands on a raised hearth, slabbed in one piece, through and under which the flexible connection from the wall plug to the terminal block is introduced. All bolts carrying the fire are embedded into the cement backing, and the whole of the fireparts are closed at the back by an asbestos-cement plate. The loading is 3 kW, and the overall dimensions of the mantel are 3 ft. 7 in. high by 2 ft. 2 in. wide by 4½ deep. The projection of the hearth from the wall is 14½ in.

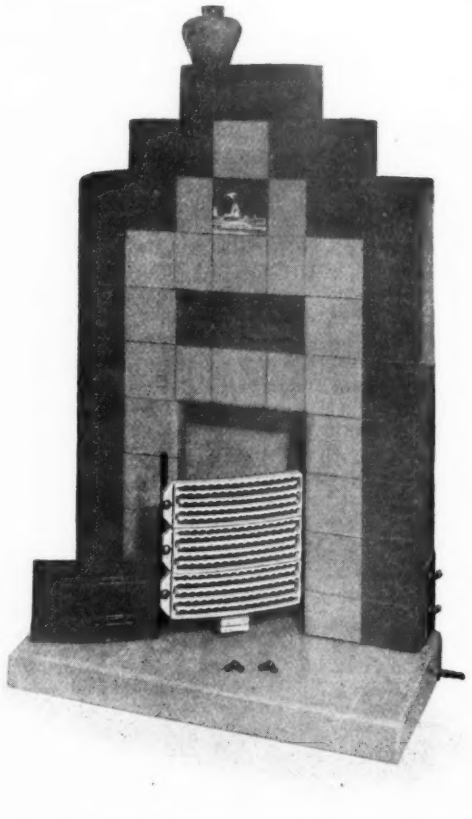


Fig. 6.—"Bell" Fireplace; Sub-frame Removed.

Business and Industrial Notes.

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures.

Central Electricity Board Contracts.

The Central Electricity Board has placed further contracts, amounting to about £750,000. They include switchgear for the Central England, Mid-East England, North-East England, South-East England and South-West England, and South Wales Schemes, orders for which have been given to the British Thomson-Houston Co., Ltd., Messrs. Ferguson, Pailin, Ltd., the General Electric Co., Ltd., Messrs. Johnson and Phillips, Ltd., the Metropolitan-Vickers Electrical Co., Ltd., and Messrs. A. Reyrolle & Co., Ltd. Contracts for transformers for the South-East England Scheme have been placed with the Brush Electrical Engineering Co., Ltd., and the English Electric Co., Ltd. Messrs. Siemens Bros. & Co., Ltd., and the Enfield Cable Works, Ltd., have been given contracts for cables required in connection with the South-West England and South Wales and the Mid-East England Schemes, respectively. A contract for the secondary transmission lines for the Mid-East England Scheme has been been placed with the J. L. Eve Construction Co., Ltd.

Australian Tariff Decisions.

The Commonwealth Department of Trade and Customs announces that under the British preferential tariff (No. 415(A)) "synthetic carbon in powder form, carbon in compressed block or rod form, and natural carbon, not crushed or further manufactured" will be admitted free of duty. "Generators for motor vehicles, up to and including 12 volts, for lighting purposes only" will be admitted free of duty when imported separately or with chassis, but if forming part of a complete car will be subject to a duty of 45 per cent. *ad valorem*.

The *Board of Trade Journal* says that a revised definition of "horse power" for the purpose of assessing the duty on a.c. motors has been made, as follows: "The horse power of an alternating current motor represents the continuous mechanical output at rated voltage and frequency with a temperature rise of 40 deg. C. above the surrounding atmosphere, except that where motors are rated by the manufacturers (or bear a name plate rating) based on a higher temperature rise than 40 deg. C., such higher temperature rise shall be taken as the basis in determining the horse power for duty purposes. Where motors are rated by the manufacturers (or bear a name plate rating) on the basis of a temperature rise of 35 deg. C. or higher, but less than 40 deg. C., the rated horse power of the motor shall be increased by 2 per cent. for each one deg. C. that the rated temperature rise is less than 40 deg. C. Where motors are rated by the manufacturers (or bear a name plate rating) on the basis of a temperature rise less than 35 deg. C., the Minister shall determine the horse power for duty purposes. The horse power for duty purposes of motors rated by manufacturers on an intermittent basis shall be the continuous mechanical output of the motor rated with a temperature rise of 40 deg. C."

The enforcement of the increased general duty (from 25 to 60 per cent.) on electric household dish-washing machines imported into Australia has been postponed until April 1st next.

Coal Cutters for Russia.

It was announced on December 2nd that an agreement had been signed providing for the placing by Arcos, Ltd., as agents for the trade delegation of the Soviet Government in Great Britain, with Messrs. MAVOR & COULSON, LTD., Glasgow, orders for different kinds of coal cutters and spares to the amount of £160,000 during the next twelve months. Satisfactory credit terms have been arranged.

Contractors' Fire Insurance.

We recently reported that the Electrical Contractors' Association was negotiating with an insurance company to secure protection for its members in the event of fire claims exceeding £10,000. The *Electrical Contractor* reports that the Association is now taking out, and paying the premium for, a comprehensive policy covering all members for claims *above* £10,000 and up to £60,000 in any one year. If a workman sets fire to a building—no matter whether the occurrence is a pure accident or not—his employer is liable for the damage and may be sued for the amount of the loss. Under the policy recommended by the Association, such claims would be met up to a limit of £10,000, but not beyond this point. Now, however, if a member finds himself confronted with a £20,000 third-party fire claim, £10,000 of this amount will be covered by his own third-party policy (assuming that he has one), the remaining £10,000 being met under the Association's extra or over-riding policy. Not more than six such claims will be met in any one year (one claim of £70,000, for example, would exhaust the cover) but such a series of losses is not to be contemplated in any one year.

Shop and Display Lighting.

At a demonstration of shop lighting, given to the members of the National Display Association at the E.L.M.A. Lighting Service Bureau, on December 3rd, Mr. W. J. Jones, M.Sc., the manager of the Bureau, said that the primary objective of the display man was to get rid of close window dressing, whilst that of the illuminating engineer was to get rid of glare. Concentration on these primary objects represent the main channels of future development. The art of open dressing in principle had widened the entire scope of display, permitting a conception of the window as a whole. Colour and balance played an important rôle in modern display. Lighting had become more and more important as the art of display progressed. The public were educated to a higher standard of light consciousness, and the kinema and theatre had made a great contribution to that achievement, and they—the public—expected good lighting in the modern shop. The two main functions of modern shop and display lighting were: (1) To enhance the display; (2) to provide attractive force especially from a distance. To retain definite and decorative competitive attractiveness was necessary to-day. In the past shopkeepers were parsimonious with electric light; to-day there was little need for this owing to price reductions. After dealing with island sites, re-entrant windows, signs, facias, and all the special features of the modern shop, and illustrating each point with lantern slides, and demonstration, the lecturer concluded by indicating the value of using luminous features in window display.

The Co-ordination of London Passenger Transport.

Public notice was given by the Treasury Solicitor last week of the proposal to introduce during the present session of Parliament a Bill to provide for the co-ordination of passenger transport in the London traffic area. The provisions of the Bill include the establishment of a Transport Board to which would be transferred all the passenger transport undertakings of the "Underground" group, the Metropolitan Railway, local authorities and those of other companies operating 'buses, &c., in the area. The Board would be empowered to raise money and generally regulate the passenger transport of London.

New Indian Companies.

Among the concerns connected with the electrical industry recently formed in India are the Kurseong Hydro-Electric Supply Co., Kurseong, Darjeeling, Bengal, capital 6,00,000 rupees; the Kumbakonan Electric Supply Corporation, Madras, 5,00,000 rupees; and the Akola Electric Supply Co., Broach, Bombay, 4,00,000 rupees.

The Irish Electricity Supply Board.

The Electricity Supply Board, which was established as a corporate body in 1927 by Act of the Irish Free State Government in order to promote the success of the Shannon hydro-electric scheme, has as one of its principal objects that of increasing the demand for electricity by means of selling electrical appliances. The Board has opened sales showrooms in over 20 of the larger towns of the Free State, and has embarked on a national propaganda campaign to popularise the use of electricity in the home. The Board is the leading distributor of electrical goods in the Free State, being in a particularly favourable position through its direct contact with consumers. One of its officers estimates that the Board supplies about 80 per cent of the demand for domestic electrical supplies, and that this proportion should easily amount to 95 per cent.

in the near future. About 50 per cent. of the Board's supplies come from Great Britain, including some products of American branch firms in this country, about 25 per cent. from Germany, 10 per cent. from Canada, and the balance from many other countries.

Illumination of a Christchurch (N.Z.) Store.

The accompanying illustration shows the New Zealand Farmers' Co-operative Association building at Christchurch (N.Z.), which is floodlighted by G.E.C. projectors. The window lighting is by the "Gecoray" window lighting system, while "Osram" lamps are employed throughout the

The Lighting of a Christchurch (N.Z.) Store.

building. As will be seen, the brilliant and even distribution of the floodlight projectors considerably enhances the attractiveness of the building at night.

Polish Cable Combine.

It is announced that all the Polish works which produce insulated conductors have combined themselves into a common sales organisation for combating foreign competition and reducing imports. The members comprise the Bendzin Cable and Wire Works, the Kabel Polski, of Bromberg, Zahm. Stach and Co., of Dziedzice, the Kabelfabrik, of Krakau, the Polish Cable Works and Copper Rolling Mills, of Warsaw, the Polish Skoda Works, Warsaw, and the Cable Industry Co., Warsaw.

A Franco-Swiss Combination.

The Société La Hydro-Electrique has been formed in Paris with a share capital of 100,000,000 fr. Among the promoters are mentioned the names of the Swiss Electrical Industry Co., the Motor-Columbus Co., and the Basle Bank of Commerce, while various French banks are connected with the company. The American Harris-Forbes group is also represented through the U.S. Overseas Corporation.

Calendars and Diaries.

A beautifully-coloured night view of a country mansion illuminates a calendar received from Britannia Batteries, Ltd., 233, Shaftesbury Avenue, W.C.2. The monthly date slips run from November, 1930, to January, 1932.

A useful feature of a diary received from the Westinghouse Electric International Co., 2, Norfolk Street, Strand, W.C.2, is a thumb-indexed memoranda section. The diary, which is of a convenient size for the pocket, also contains notes on electrical and steam plant, &c.

All the consumers on the system of the North Metropolitan Electric Power Supply Co., are receiving a very neat wall calendar with weekly slips and a warm-coloured picture of a pretty girl. The calendar is accompanied by a special Christmas folder containing suggestions for gifts.

A Quaint Request.

Pointing out that they are not supplying the flour mill for which they are to be thanked, Messrs. Crompton Parkinson, Ltd., send us a copy of a postcard received by their Calcutta branch. This reads as follows:—

"Dear Manager,—Will you kindly Send me Catalouge of your firm of Motor & Starter at an early date as I am intending to Set up a flour Mill for which I shall thank you. I have the honour etc Yours Mohamed Quaiyum Nabi Bux's Compound Sipri Bazar Jhansi.

"To the Manager Crompton Parkinsan 3 plase Slip ring wound rater Moter Calcutta, Calcutta."

Markets for Domestic Electrical Appliances.

Confidential reports on the markets for domestic electrical appliances in Greece, Italy and Portugal have been prepared by the Department of Overseas Trade from information furnished by its officers in those countries. United Kingdom firms desirous of receiving copies of the reports should communicate with the Department, 35, Old Queen Street, London, S.W.1, quoting reference numbers A.X. 10574, A.X. 10581 and A.X. 10589, respectively.

Recent Contracts.

The latest of a number of important electric traction contracts that have been placed with the English Electric Co., Ltd., recently is one from Leyton Borough Council for 50 double-deck tramcar bodies. These will be generally similar to the 50 bodies recently completed for the London County Council by the same company. Structurally the bodies are of metal design, and therefore, are not only safer and more durable, but also give an appreciably greater useful width in the saloons than was possible with older methods of construction. The seating is luxurious, the backs being upholstered as well as the seats themselves; the floors are covered with special linoleum, and the scheme of decoration is simple and bright. Much attention has been given to providing thorough but draughtless ventilation, and in addition to special ventilators, the upper saloon is fitted with half drop windows. Ample illumination is provided on both decks. The value of the order is approximately £90,000.

The Hart Accumulator Co., Ltd., has recently received, among other orders for batteries for kinema emergency electric lighting, orders for installations at the Forum Kinema, Fulham, and the East Sheen Kinema.

Book Notices.

An advance copy of a new quarterly publication called "Decoration—Beauty and the Home" has been received from Messrs. A. G. Reynolds & Co., Ltd. The magazine is published at one shilling, and its object is "to stimulate the love of beauty and suggest means of gratifying it in our homes." Included in the first issue are interesting articles on heating and lighting. The illustrations are excellent, many of them being in colour.

The Equipment & Engineering Co., Ltd., has celebrated its twenty-first birthday by the publication of a little souvenir booklet entitled "Ghosts Grave and Gay" by E. P. Leigh-Bennett. Some interesting facts are given about old London and there are many quaint illustrations. The company also describes its works and products in another booklet—"About Ourselves."

A well-illustrated publication has recently been received from the Power Corporation of Canada, describing some of the activities of its engineering, construction and industrial divisions.

We have received from the Alloy Welding Processes, Ltd., an interesting illustrated booklet written by Mr. F. Leverick, entitled "Welding for the Chemical Industry."

"Safety Methods in Power System Construction."—Publication No. 045 of the National Electric Light Association (U.S.A.). Price to non-members $1.25.

Falk, Stadelmann's Leeds Branch.

The accompanying illustration shows part of the showrooms of the new Leeds branch of Falk, Stadelmann & Co., Ltd., situate at 15, 17, 19, New Station Street, Leeds. The premises comprise five floors, two of which are utilised as showrooms. A very large range of up-to-date electrical fittings are displayed, and the system adopted, entailing some hundreds of lighting points, enables the lighting of each fitting to be individually controlled. It has been the com-

Falk, Stadelmann's Lighting Fittings Display at Leeds.

pany's objective to provide a showroom where contractors' customers can conveniently view in comfort the most up-to-date fittings which the contractor is not in a position to stock or display effectively. For the convenience of the contractor buying for stock, however, the company is also showing a very large range of shades, bowls, &c., so arranged that each individual piece can be separately illuminated. A full range of "Radiolectric" fires made at its Rainhill factory is also displayed. There is also an electric kitchen, in which are shown the larger domestic appliances, such as cookers, wash boilers, warming plates, &c. The trade counter is situated at the back of the premises, with an entrance in Alfred Street.

It can also be reached through the showroom. The second, third, and fourth floors are required to accommodate the heavy stocks carried.

For Sale.

The Alderley Edge and Wilmslow Electricity Board has for sale d.c. motors, meters and a battery.

Generating sets, boilers, &c., are offered for sale by Messrs. Oxley & Co. (Machinery), Ltd.

Messrs. Wood & Cairns, Ltd., have for disposal a surplus stock of fuseboards and small motors.

Several d.c. motors are offered for sale by Clayton Wagons, Ltd., of Lincoln.

(See our advertisement pages to-day.)

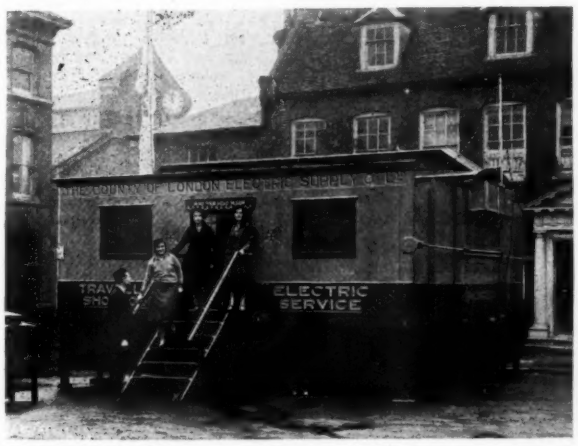
Trade Announcements.

THOR LAMPS & SUPPLIES, LTD., Cardiff, having acquired the manufacturing rights and the use of patents, designs, &c., of the lamps and lamp-room equipment at present manufactured by the Concordia Elektricitäts A.G., of Dortmund, has decided to change its title to "THE CONCORDIA ELECTRIC SAFETY LAMP CO., LTD." The business relating to "Thor," "Ceag" and "Oldham" lamps will be continued.

A Travelling Electrical Showroom.

On December 4th a Press visit was made to Rochford to inspect a travelling electrical showroom specially built for the COUNTY OF LONDON ELECTRIC SUPPLY CO., LTD., for the purpose of popularising electricity and to exhibit and demonstrate the latest electrical appliances for the home and the shop to the inhabitants of the villages and smaller towns in the company's rural areas. Living as they do at considerable distances from the centres where permanent showrooms are established, they have a fully-equipped showroom brought to their doors. The travelling showroom is staffed by a manager and attendants who are qualified to give full information regarding the supply of electricity and the prices of all kinds of electrical appliances, and to assist in every way present and potential consumers. The showroom, when closed for travelling from one point to another, is no larger than a medium-sized pantechnicon van. Arrived at its resting place, however, it opens telescopically to an exhibition hall with a superficial area of 484 ft. Handsomely panelled in mahogany, equipped with electric lamps and shades, fires of various kinds, cookers, washers, mangles, toasters, hot-water apparatus, kettles—"slimmers," hair-wavers, curlers and dryers for the ladies—wireless sets and many other aids to the comfort, efficiency and cleanliness of the home and business premises, the showroom is welcomed not only for its utility but for its entertainment; demonstrations are given by visiting experts. Its weight is about six tons as fitted, and it is hauled from place to place by a specially-adapted lorry. It draws its current from the company's mains, so that its advent is a welcome sign that the district is "alive" from the electric standpoint. Four men are required for a full day to "open out" the van, setting it level and true upon its foundations and arranging the exhibits. A special route has to be mapped out that the roads shall be of the appropriate grade, and the bridges wide and strong enough to bear it.

At a luncheon which preceded the inspection Mr. J. C. Dalton, manager and secretary of the company, who presided, stated that the van had already been visited by approximately 7,000 people.



The County of London Company's Travelling Showroom.

Australian Electrical Manufacturing Progress.

In an introduction to the new edition of the booklet of the Electrical Manufacturers' Association of New South Wales, Sir Dudley Le Chair, lately Governor of the State, remarks that electrical manufacture in Australia has made wonderful strides since the war. It may rightly be termed a war industry, he states, and "if we are to build a new Britain in the southern seas, Australia's electrical manufacturing industries will be closely linked up in the construction, and our highest objective should be to become entirely self-contained as far as the electrical requirements of this country are concerned."

Visits to "Osram" Works.

Members of the Cardiff Chamber of Trade recently visited the Osram-G.E.C. Lamp Works, Hammersmith, as well as upwards of one hundred prominent members of electrical organisations from Birmingham and Nottingham, when they also inspected the new lamp works at Wembley, which has been designed for the dual purpose of making lamps and providing good working conditions for people who make them.

Social Events.

Some 50 members of the recently formed Ex-Verity Association, which consists of ex-employes of Verity's, Ltd. (several from the provinces), spent an enjoyable evening at Gatti's Restaurant, Strand, W.C., on December 4th. The occasion was the first general meeting of the Association, and was preceded by dinner. The chairman, Mr. H. J. Grant (Alliance Wholesale, Ltd.), in responding to the toast of "The Association," proposed by Mr. A. G. Marsh, outlined its objects, emphasising that whilst these were mainly social, there would be occasions when its members could co-operate in a general spirit of helpfulness and goodwill. The secretary, Mr. W. M. Tribute (Hoover, Ltd.), acknowledging his election to that post, reviewed progress and the membership roll. Quite a number present had not met since pre-war days, and therefore "happy reminiscences" was the order of the evening. The secretary states that he will be glad to hear from all who are qualified for membership, his address being 229, Regent Street, W.1. The next meeting of the Association will be a smoking concert to be held at the end of February.

The Amateur Dramatic Section of the Osram-G.E.C. Social and Athletic Club gave an excellent performance of Noel Coward's "Hay Fever" on the evenings of December 1st, 2nd and 3rd. The competent acting emphasised the hard work put in at rehearsals. The production was the sixth in three years, and the dining room at the Osram works was well filled on each evening, the audiences testifying enthusiastically to the success of the production. Musical interludes were given on all three evenings by the Osram Dance Orchestra.

Henley's Dramatic Society presented "Kick In" at the Cripplegate Theatre, E.C., on Monday evening last, and, as we have been led to expect, the performance was an excellent one. The four-act play chosen—a "fascinating and thrilling drama of the New York underworld"—was, however, of a rather primitive character. It was a departure from the Society's usual line and not a fortunate one we think. However, within the limited scope afforded them, the players did well. We would perhaps divide top honours between Deputy-Commissioner Garvey (Mr. Hugh Stanley) and Chick Hewes (Mr. A. V. Burnett), although the latter's natural humour was restricted by the part. Miss Fay Smith acted the part of Myrtle Sylvester splendidly, and Miss Edith Wade (Molly Hewes) sustained a rather trying rôle very well. The Irish accent of Mrs. Halleron (Miss Hilda Sneddon) was a trifle Glaswegian. Mr. Robert K. Edney was thoroughly villainous as "Whip" Fogarty, and as the "dope" fiend, Charley Carey, Mr. W. G. Turner, was a genuine bundle of nerves. The rest of the cast all deserve praise for their work—Mr. Herbert S. Manser (as Jack Diggs), Miss Joan Earl (Memphis Bessy), Mr. C. Morgan (Old Tom), Miss Kitty Thurgood (Daisy Halleron) and Mr. J. A. Wright (Gus). Mr. Frank J. Bettley is to be congratulated on his production. Mr. Henry Thornton, who has produced all the previous plays put on by the Society, was the subject of an expression of thanks in the programme.

The staff dinner of the Southend Electric Lighting Department was held recently at Garon's Restaurant, Mr. A. C. Johnson, borough electrical engineer, presiding. Councillor Le Masurier, chairman of the Electricity Committee, in the course of a speech said that in 1920 the number of consumers connected to the mains was 6,500. To-day it was 23,273. The electrical energy generated ten years ago was 4,250,000 kWh, while to-day the total was 21,103,000 kWh. In connection with the change-over from d.c. to a.c., over 51 per cent. of the area in the borough was now receiving an a.c. supply. Mr. Johnson, in reply, said he hoped that under the national electricity scheme, most of the employés now on the generation side would be transferred to the distribution department.

Bankruptcy Proceedings.

D. C. BREGA, wireless and gramophone dealer, 305, King's Road, Chelsea.—The public examination of this debtor was held on December 3rd at the London Bankruptcy Court before Mr. Registrar Warmington. The accounts showed liabilities of £599 and a surplus of £239. In reply to Mr. Gaine, Official Receiver, the debtor said that in 1925 he and a partner began business under the style of "Brega's Radio Service." The partner retired in August, 1918, and witness paid him £50 and agreed to pay another £50 which, however, was owing at the date of the receiving order. He (debtor) took over the liabilities and assets and continued the business until the failure. That situation was brought about by the non-receipt of promised finance with which to exploit a radio-gramophone owing to which he was unable to get together the fees for an extension of the provisional patent. The examination was concluded.

W. L. KELSHAW, 168, Baslow Road, Totley, Derbyshire, electrical engineer.—The first meeting of creditors was held at the Official Receiver's offices, Sheffield, on December 3rd, when the statement of affairs submitted showed unsecured liabilities of £471, and a deficiency of £409. The debtor attributed his failure to "small profits and scarcity of trade during the last twelve months." The case, being a summary one, was left in the hands of the Official Receiver as trustee.

F. W. HODGES, 9a, Station Hill, Kidderminster, electrical engineer.—The public examination of this debtor was held at the Town Hall, Kidderminster, recently, when he submitted a statement of affairs which showed liabilities of £528, and net assets of £217, leaving a deficiency of £311. The debtor attributed his failure to "the fall in prices of goods, book debts, and heavy expenses." The examination was closed.

H. PLOVER, electrical apparatus and tool merchant, Market Lane, Newcastle-upon-Tyne.—Trustee, Mr. R. K. Clark, 81, St. Mary's Place, Newcastle-upon-Tyne, Official Receiver, released November 11th.

V. F. MADDOX, electrical and wireless engineer, 6, Howard Street, Ledbury.—Trustee, Mr. O. B. Wallis, 133, Saint Owen Street, Hereford, Official Receiver, released November 24th.

H. GARTSIDE (H. TAYLOR & Co.), electrician and wireless dealer, the Arcade, Waterfoot.—Last day for receiving proofs for dividend, December 20th. Trustee, Mr. J. D. Turner, Byrom Street, Manchester, Official Receiver.

I. TURNER, wireless dealer, 103a, Little Ilford Lane, Manor Park, E.12.—First and final dividend of 8½d. in the £, payable at Bankruptcy Buildings, Carey Street, W.C.2.

Under this heading in our last issue we published a note relating to J. P. Hayes, trading as the "Evening World Radio-Gram. Stores and Service," Bristol. The Editor of the Bristol *Evening World* asks us to state that the business is in no way associated with his newpaper and the debtor was never authorised to use the name.

Company Liquidations.

DUNHAMS, LTD., radio and electrical engineers, 7, New Wharf Road, N.1.—A further meeting of the creditors in this matter was held on December 1st at the offices of Messrs. Philip Mordant, Jarvis & Co. At the last meeting it was decided to adjourn in order that the two companies concerned should meet to see whether any proposal could be submitted which would be acceptable to both parties. It was further stated then that the liabilities amounted to £4,115, against net assets of £1,056. At the adjourned meeting it was stated that the Vulco Dry Battery Co., Ltd., had come to an arrangement whereby it agreed to purchase the assets of Dunhams, Ltd., for a sum sufficient to pay the costs of the liquidation and to provide the creditors with 8s. in the £ on their debts. It was resolved that the liquidation should be confirmed, and Mr. Jarvis and Mr. W. A. J. Osborne, of the British Traders' Association, Balfour House, Finsbury Pavement, E.C., were appointed joint liquidators.

STEWART THOMSON & PATRICK, LTD., Liverpool.—The statutory meeting of creditors was held at the office of the liquidator, Mr. E. K. Williams, 30, North John Street, Liverpool, on December 4th. The liquidator reported that the company was a private one formed in 1920 to take over the business of Stewart Thomson & Son. Recent accounts showed that there had been losses during the past three years. The two directors never drew more than £5 a week from the business, and had recently drawn only £3 per week. The statement of affairs showed a deficiency of £1,972, but no allowance had been made in respect of a lease and certain machinery, furniture, &c. The appointment of Mr. Williams as liquidator was confirmed, and a committee of inspection was appointed. Mr. Williams is continuing the business with a view to its disposal as a going concern.

DUDLEY, STOURBRIDGE & DISTRICT ELECTRIC TRACTION CO., LTD.—A general meeting is to be held at 88, Kingsway, W.C., on January 28th, to receive an account of the winding up of the company by the liquidator, Mr. R. P. Beddow.

IDEAL WIRELESS CO., LTD.—Liquidator, Mr. H. J. Eldridge, 133, Moorgate, E.C.2, released November 18th.

NORTHALLERTON ELECTRIC LIGHT & POWER CO., LTD.—Winding up voluntarily. Joint liquidators, Mr. J. Hunt, Mr. H. W. Milnes and Mr. J. W. Kirk.

IMPERIAL TRAMWAYS CO., LTD.—Particulars of claims by December 21st to the liquidator, Sir W. McLintock, 71, Queen Street, E.C.4.

Dissolution of Partnership.

LANGDON ELECTRICAL CO., electrical contractors, Water Lane, Watford.—Mr. W. J. Latimer and Mr. T. T. Reedy have dissolved partnership. Mr. Latimer will attend to debts and carry on the business.

The Marking of Imported Lamps.

With reference to the note which appeared in our last issue respecting a Direction with regard to certain descriptions of imported electric incandescent lamps, the Board of Trade announces that a draft Order-in-Council was laid before Parliament on December 1st, under which it is provided that imported electric incandescent lamps of ornamental design with bulbs to which, on account of their uneven surface, it is not practically possible to apply an indelible indication of origin should, as an alternative, be allowed to have the indication of origin indelibly stamped, embossed, incised or impressed on the cap.

Unemployment.

There was an increase of 473 in the number of persons on the registers of employment exchanges in Great Britain during the week ended November 24th, at which date the total number was 2,286,460, as compared with 2,285,987 on November 17th, and 1,285,458 on November 25th, 1929.

New Catalogues and Lists.

The CAMBRIDGE INSTRUMENT CO., LTD., 45, Grosvenor Place, London, S.W.1.—A postcard relating to the "Grassot Fluxometer" for measuring the flux of magnets.

YOUNG, OSMOND & YOUNG, LTD., 47, Victoria Street, Westminster, S.W.1.—A card giving particulars of the "Unity" tubular heater.

The DRAYTON REGULATOR & INSTRUMENT CO., LTD., West Drayton, Middlesex.—A publication dealing with the J.C.E. volume meters.

The LANCASHIRE DYNAMO & MOTOR CO., LTD., Trafford Park, Manchester.—A revised stock list, giving comprehensive details of "Maxtorq" squirrel-cage and slip-ring motors; also sheet No. 2018, dealing with grease for ball and roller bearings.

FALK, STADELMANN & CO., LTD., 83-93, Farringdon Road, London, E.C.1.—Catalogues and leaflets dealing with glass shades, bowl fittings, and units (No. 642), wood floor and table standards and shades (No. 639), "Efesca" electric breakfast cooker and boiling plates (P 1440), and electric fires (P 1439); also a showcard (No. 213) and a window bill (No. 214) of the "Purovox" loud-speaker, and a showcard (No. P 202) illustrating "Efescaphone" radio receiving sets.

HEYES & CO., LTD., Water-Heyes Electrical Works, Wigan.—Catalogue F.2, giving particulars, illustrations, and prices of "Wigan" industrial, ship, mining, wellglass, "Lacent" and explosion-proof fittings; also catalogue E.P.1, dealing particularly with the "Wigan" explosion-proof electrical apparatus.

The MARCONIPHONE CO., LTD., 210-212, Tottenham Court Road, London, W.1.—The December issue of "Radio," Part VI of Captain Eckersley's articles "Radio Service for the Dealer," and a circular letter sent to dealers in "Marconiphone" apparatus.

BRITISH INSULATED CABLES, LTD., Prescot, Lancs.—An interesting booklet on the electrical wiring of ships.

The GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2.—A catalogue (section WO), illustrating and describing G.E.C. overhead line fittings.

BRITANNIA BATTERIES, LTD., 223, Shaftesbury Avenue, London, W.C.2.—An attractive showcard dealing with the merits of the "Pertrix" battery for automobile use.

The REVO ELECTRIC CO., LTD., Britannia Works, Tividale, Tipton, Staffs.—An illustrated and priced folder dealing with fires, kettles, irons, hot-plates, &c.

C. H. BYRON & Co., Belakes Road, Bearwood.—A booklet describing an extensive range of bakelite bell pushes.

ALAN WRIGHT, 117, Victoria Street, London, S.W.1.—A postcard illustrating the new "Inventum" automobile foot-warmer.

L. G. HAWKINS & Co., LTD., 30-35, Drury Lane, London, W.C.2.—A collection of literature dealing with "Magicoal" electric fires, "Hera" washers, and a device for preventing steam and moisture on window panes, called "Peter the Seer"; also the December issue of "The Link."

The Timber Market.

Our Timber Trade Correspondent writes: The demand for European house and general building timbers has shown a decline over the past month. Prices are on the low side except for some special sizes and qualities in light stock, and for which there is usually a steadily maintained demand. Winter supplies on the whole are moderate, and it would occasion no surprise if values firmed up a few weeks hence. Inquiries for hardwoods continue to be quiet; mahogany logs keep fairly firm, teak especially so, whilst for other logs supplies keep moderate with rates steady. Home and colonial woods certainly should be in better call, not merely for sentimental reasons, but practical ones also. The bad state of American industry generally is responsible for increasing quantities of American woods being forced on to this market at low prices. Plywood supplies this year are not so large as last, and foreign shippers are offering more cheaply to induce business, but present United Kingdom consumption is dull and not likely to change, at the earliest, until the turn of the year.

Prices of Raw Materials.

The following prices are only general, and they may vary according to quantities and other circumstances:—

	CHEMICALS, &c.	Price Dec. 9th	Fortnight's inc. or dec.
a	Acid, Oxalic ... ... per lb.	5½d.	...
a	Ammoniac, Sal ... ... per ton	£60	...
a	Ammonia, Muriate (large crystal) ,,	£52	...
a	Bisulphide of Carbon ... ... ,,	...	...
a	Borax ... ... ,,	£17	...
a	Copper Sulphate ... ... ,,	£25 10s.	...
a	Potash, Chlorate ... . per lb.	3d. to 4d.	...
a	,, Perchlorate ... ... ,,	5½d.	...
a	Shellac ... ... per cwt.	£13 10s.	...
a	Sulphur, Commercial ... ... ,,	£11	...
a	,, Roll ... ... ,,	£11	...
a	Soda, Chlorate ... ... per lb.	3d.	...
a	,, Crystals ... ... per ton.	£5 to £5 5s.	...
a	Sodium Bichromate, casks ... per lb.	3½d.	½d. inc.
	METALS, &c.		
b	Aluminium, Ingots ... ... per ton.	£85 to £90	...
b	,, Wire ... ... per lb.	1/1 to 1/9	...
b	,, Sheet ... ... ,,	1/1 to 2/9	...
p	Babbitts Metal and Anti-friction Metals—		
	Grade I ... ... per ton net.	£112	£1 dec.
	Grade II ... ... ,, ,,	£81	£1 dec.
	Grade III ... ... ,, ,,	£60	...
c	Brass (rolled metal 2" to 12" basis) per lb.	6¼d.	...
c	,, Tubes (solid drawn) ... ,,	10½d. to 10⅞d.	...
c	,, Wire, basis ... ... ,,	9d.	...
c	Copper Tubes (solid drawn) ... ,,	1/-	...
g	,, Bars (best selected) ... per ton	£84	...
g	,, Sheet ... ... ,,	£84	...
g	,, Rod ... ... ,,	£84	...
d	,, (Electrolytic) Bars ... ,,	£'s 15s.	...
d	Sheets ...	£143 10s.	...
d	, Wire Rods ,,	£66 15s.	...
d	,, ,, H.C. Wire per lb.	8½d.	...
f	Ebonite Rod	2/3 to 2/6	...
f	,, Sheet	2/3 to 2/6	...
n	German Silver Wire ... ... ,,	2/1	...
h	Gutta-percha, fine	nom.	...
h	India-rubber, Para fine ... ... ,,	6¼d.	...
i	Iron, Pig (Cleveland No. 3.) ... per ton.	6-4/6	12s. dec.
l	,, Wire, galv. No. 8. P.O. qual. ,,	£20	...
g	Lead, English pig ... ... ,,	£17	10s. dec.
g	Mercury ... ... per bot.	£22 7s. 6d. to £22 10s.	2s. 6d. dec.
e	Mica (in original cases) small ... per lb.	6d. to 8/-	...
e	,, ,, medium ,,	4/- to 8/-	...
e	,, ,, large ... ,,	10/- to 20/- & up	...
p	Phosphor Bronze, plain castings ,,	1/1½d.	...
p	,, ,, drawn bars & rods ,,	1/1½d.	...
p	,, ,, rolled strip & sheet ,,	1/1½d.	...
p	,, ,, wire ... ... ,,	1/2d.	...
e	Platinum ... ... per oz.	£7	...
d	Silicium Bronze Wire ... ... per lb.	9½d.	...
r	Steel, Magnet, in bars ... ... ,,	7½d.	...
g	Tin, Block (English) ... ... per ton	£118 to £114	£2 10s. dec.
n	,, Wire, Nos. 1 to 16 ... ... per lb.	2/11	...

*For 1 cwt. lots. Special quotations against definite specifications.

Quotations supplied by

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
n P. Ormiston & Sons.
o Johnson, Matthey & Co., Ltd.
p C. Clifford & Son, Ltd.
W. F. Dennis & Co.

Reporting on December 6th, Messrs. James Forster & Co. stated that the lead market last week was again mainly professional, prices fluctuating within narrow limits. Consumers' demand remains dull, and is hardly likely to improve in the near future with the approach of the holiday season. Prospective supplies promise to be considerable. But for the control, prices would be standing at a lower level, but so long as producers are content to store surplus arrivals, a steady tone may be maintained for a time, although sooner or later prices will find their true level.

Lighting and Power Notes.

Aberdeen.—NEW PLANT.—Application is to be made by the Corporation Electricity Committee to the Electricity Commissioners for permission to procure a house set for the electricity works at an estimated cost of £7,900.

EXTENSIONS.—The Electricity Committee has granted the application of the governors of the Linn Moor Home at Culter for the installation of electricity. The managers of the home will have the option of paying the cost of laying the underground cable, estimated at £920, or undertaking to consume a certain amount of electricity each year for the first three years.

Barrow-in-Furness.—SUPPLY TO BROUGHTON.—The Barrow Town Council has received sanction from the Ministry of Transport to the erection of overhead lines in the parish of Broughton-in-Furness.

UNEMPLOYMENT SCHEME.—The Unemployment Grants Committee has approved, for the purpose of a grant, a scheme estimated to cost £7,440 for the supply of electricity to Askam and Ireleth, Sandside, &c.

Beckenham.—REVISED TARIFFS.—The Urban District Council has made the following reductions in its charges for electricity:—Lighting, flat rate: From 5d. to 4¾d. per kWh. Special rate for the lighting of churches, hospitals, &c., and business premises: From 4¼d. to 4¼d. per kWh. Shop-window lighting: From 3¼d. to 3¼d. per kWh. Heating, flat rate: From 2d. to 1¼d. per kWh. Cooking, water heating, and refrigerating: From 1d. to 0.9d. per kWh in the winter, and to ¾d. in the summer. All-in rate scale: "Unit" charge reduced from 1¼d. to 1¼d. in the winter, and from 1d. to ¾d. in the summer. Second all-in scale: "Unit" charge reduced from 1d. to 0.9d. per kWh in the winter, the summer charge to remain at ¾d. Water heating: From 0.75d. to 0.6d. per kWh, and rent of time switch from 5s. per quarter to 2s. 6d. Reductions have also been made in the charges to housing estates under various schemes, and the new rate of £12 10s. per kW installed is to be available for business premises, electricity being charged for at the all-in rate. Charges for apparatus and appliances have also been considerably reduced.

Bognor Regis.—COUNCIL CONTEMPLATES ACQUISITION OF UNDERTAKING.—At a recent meeting of the Town Council, it was decided that the question of the acquisition of the electricity undertaking of the Bognor Regis Gas and Electricity Co., should be investigated by the Legal Committee.

Bristol.—LOANS.—The Corporation Electricity Committee is applying for sanction to loans of £10,000 and £3,500 for the schemes for the hire of cookers and cooker wiring, respectively.

Burnley.—MAINS EXTENSIONS.—The Corporation Electricity Committee is applying to the Electricity Commissioners for sanction to capital expenditure of £16,492 from revenue, and to a loan of £20,000 to meet the Department's anticipated expenditure on mains extensions and services up to March, 1932.

Burton-on-Trent.—EXTENSIONS.—At a recent meeting of the Corporation Electricity Committee, the electrical engineer stated that the villages of Linton and Linton Heath had been canvassed, and he suggested that, in view of the number of houses requiring a supply of electricity, work in connection with the supply should be carried out at a cost of £1,926. The Committee decided that the work should be carried out by the Electricity Department's workmen.

LOANS SANCTIONED.—The Corporation has received sanction to the borrowing of £43,846 for electricity mains, services and transformers.

Chesterfield.—ALTERNATIVE CHARGES.—The Town Council is recommended to adopt, in addition to the existing flat rate of 4d. per kWh, the following alternative charges to consumers for the lighting of business premises: between 3 p.m. and 9 p.m. from October to March, 6d. per kWh; between 9 p.m. and 3 p.m. for the whole year, 2d. per kWh. The new charge is only to be available to consumers subject to their agreeing to pay a minimum sum equal to the last full year's bill at the existing flat rate.

Continental.—ITALY.—The year 1930 has witnessed further steady progress in the Italian electrical industry, both in production of power and enlargement of existing and installation of new plants. Of the last-named Northern Italy possesses about 75 per cent., Central Italy 15 per cent., and Southern Italy and the Islands (Sicily and Sardinia) 10 per cent. The electricity supply is almost wholly a.c., but is not of the same frequency on all the systems. Transmission at 130,000 V is usual, but lines at 220 000 V are under construction. Power-transmission lines and high-pressure systems have attained a length of 70,000 km.; low-pressure systems exceed 50,000 km. The number of reservoirs has increased to 84 with a total capacity of 1,255.2 million cu. m., the power equivalent being 1,003.7 million kWh. Next year eight more reservoirs are to be constructed, seven in Northern and one in Southern Italy. The bulk of the power is hydraulic, but steam, gas, and heavy oil are also employed.

There are 1,187 privately-owned electrical undertakings in Italy, in addition to 300 owned individually or jointly by municipalities and other bodies. Most of the undertakings have small capitals, only one having a capital exceeding 1,000 million lire. During the year, in accordance with the Government policy, steady progress has been made in amalgamations of the smaller with larger concerns. The invested capital exceeds 12,000 million lire; over 2,000 million was raised aboad.

Theoretical power available amounts to 240,000 million kWh per annum, but the actual output does not exceed 60,000 million kWh, of which 32,000 million kWh is used industrially. While at the end of 1929 over 10,600 million kWh of hydro-electric power was generated, the total at the end of 1931 is expected to reach 12,000 million kWh. Over 7,600 municipalities and communes are supplied with electricity. The average annual increase in the use of electricity has been about 10 per cent., and the total consumption is now estimated at 8,100 million kWh. The power used for illumination purposes amounts to 920 million kWh; traction consumes 720 million kWh and 2,950 million kWh is used for various industrial purposes; the heavy industries absorb the balance, 3,500 million kWh.—*Reuter's Trade Service* (Milan).

HUNGARY.—According to a report just to hand from Budapest, an important Bill to be introduced in the next session of the Hungarian Parliament is the so-called "Electrical Energy Bill." In view of the present uneconomical method of production of electrical energy in Hungary, the need for such legislation is generally recognised. It is believed that if proper encouragement is given, important developments may be expected in Hungary in the near future. The contemplated new law contains important regulations safeguarding the interests of both the undertakers and the general public.

East Grinstead.—EXTENSION SCHEME.—The Urban District Council has decided to have prepared a comprehensive scheme for the extension of the electricity undertaking.

Glasgow.—PUBLIC LIGHTING.—The report of the inspector of lighting, Mr. S. B. Langlands, on the public lighting of the city for the two years ended May 31st last shows that the total length of roads lighted by electricity increased during that period from 160 to 224 miles, the total mileage of streets lighted by all methods rising from 572 to 618. The number of electric street lamps, both public and private, was 12,526 at May 31st last, 3,932 being added during the two years. The gross expenditure of the City Lighting Department amounted to £347,514 in 1928-29 and £339,661 in 1929-30, of which sums £17,000 and £32,600, respectively, were required for the provision of lighting in newly-formed streets.

Hull.—PREPARATIONS FOR THE GRID.—At a recent meeting of the Electricity Committee, the engineer, Mr. J. N. Waite, reported that owing to the increase in plant capacity and to the further increase which would take place when the Sculcoates generating station was linked up to the Grid (which it was anticipated will take place next year), certain modifications would be necessary to ensure the safety of the e.h.p. main switchgear. He recommended that the section of the original switchgear should be replaced by modern ironclad switchgear of the same type and make as that already existing in the remainder of the switchboard, at an estimated cost of £9,184. He further reported that, on the recommendation of the Central Electricity Board, it would be necessary to install reactors and switchgear of the same type as above for the main busbars at an estimated cost of £6,837; the standing charges on the latter would be divided equally between the Department and the Central Electricity Board. The recommendations were approved.

LOAN SANCTIONED.—The Corporation Electricity Committee has obtained sanction to the borrowing of a further £25,000 for the purposes of a wiring scheme.

Inverness.—EXTENSION OF PLANT.—The Town Council has approved a recommendation of the Electricity Committee for a further extension of the town's electricity plant, and application is to be made to the Electricity Commissioners for sanction to proceed with the installation of additional generating plant having a capacity of approximately 1,500 kW, and the provision of an additional 500-kW rotary convertor at the Bank Lane sub-station. The estimated cost of the extensions is £10,500 for the generating plant, £6,500 for a new boiler, and £3,680 for the rotary convertor.

Irish Free State.—NAVAN, CO. MEATH.—The Urban District Council has received intimation from the Electricity Supply Board that the Navan electricity undertaking will be acquired by the Board on March 31st, 1931, and that it is hoped to have full connection with Navan completed by midsummer.

Liverpool.—EXTENSIONS.—The Corporation intends to extend h.p. and l.p. mains to two sub-stations in the Tarbock area at an estimated cost of £4,987. The consent of the Minister of Transport is now also being sought to the erection of overhead lines in Aintree and Netherton.

REDUCED CHARGE FOR HEATING.—The Corporation Electricity Committee has decided to reduce the price of electricity supplied for heating purposes during restricted hours to 0.3d. per kWh in approved cases.

London.—BERMONDSEY.—The Borough Council Electricity Committee proposes to commence work in the spring on the improvement of the lighting in Tooley Street.

Maidstone.—LOAN SANCTIONED.—The Town Council has received sanction to a loan of £14,371 for the laying of mains as a scheme for the relief of unemployment.

Newport (Salop).—ELECTRICITY SCHEME.—At a recent meeting of the Rural District Council, Mr. E. F. Hetherington, chief engineer and manager of the West Midlands Joint Electricity Authority, attended and stated that the transmission line from Ironbridge to Wellington was nearing completion, and that tenders had been invited for the transmission line to Newport. This scheme is included in the first year's programme of the Authority, the second year's programme including a line at a lower pressure for villages in the Newport area. The whole scheme will involve an expenditure of over £250,000. The charge for lighting will be 8d. per kWh, while for heating, cooking, and other domestic purposes, there will be a fixed charge of 1s. 9d. per quarter for each 100 sq. ft. of floor area, plus 1d. per kWh consumed. For business premises there will be a special tariff of 1d. per kWh plus a fixed charge of 6s. 6d. per quarter per 100 watts of lamps installed, and low terms for power.

Northern Ireland.—OMAGH (CO. TYRONE).—The electricity scheme for Omagh is expected to be ready for inauguration by December 21st.

Nottingham.—SERVICE CHARGE DISCONTINUED.—The Corporation Electricity Committee has decided to discontinue its service charge of £4 for connecting premises at a distance of under 20 ft. from the Electricity Department's mains. If the premises are more than 20 ft. from a main, a nominal charge will be made for the extra distance.

Sheffield.—SUPPLY TO DRONFIELD.—An agreement has been reached by which the Corporation is to supply Dronfield with electricity at 4.8d. per kWh. The Derbyshire & Nottinghamshire Electric Power Company has agreed to withdraw its opposition to the Corporation's application for confirmation of the Order to supply Dronfield, a condition being that the Dronfield Urban District Council shall no longer refuse permission to the company to take certain transmission lines through Dronfield for the supply of power in the district.

MAINS EXTENSIONS.—The Corporation Electric Supply Committee has approved mains extensions costing £7,510.

Southend-on-Sea.—YEAR'S WORKING.—The accounts of the Corporation Electricity Department (engineer: Mr. A. C. Johnson) for the year ended March 31st last show a total revenue of £216,755 and a working expenditure of £126,693. The gross profit amounted to £90,063 and to it was added £59,605, credit balance from the previous year's account, and £2,383 from other sources, making a total of £152,051 available. From this the following items had to be paid: Loan interest and repayments, £51,055; superseded works, £12,134; renewal of battery, £3,159; work of a capital nature, £5,04; plant and fittings written off, £1,126; reserve fund, £8,000; transfer to general rate, £5,300; other items, £1,355. There remained, therefore, a credit balance of £54,908, of which £4,700 was appropriated for the relief of rates. During the year the capital expenditure amounted to £92,475 the chief items being £60,022 for mains and services and £19,521 for machinery. The electrical energy sold increased from 16,573,166 to 17,533,440 kWh and the maximum demand from 8,182 to 8,533 kW.

South Shields.—EXTENSIONS.—The Rural District Council proposes to install electric lighting at East Jarrow and Simonside.

Torquay.—PROPOSED PURCHASE OF THURLESTONE UNDERTAKING.—At a recent meeting of the Corporation Electricity Committee, the town clerk reported in regard to the Thurlestone electricity undertaking, that the Committee had already indicated its willingness to accept the Electricity Commissioners' suggestion of purchase and that certain preliminary negotiations had already taken place. The chairman and vice-chairman with the town clerk and engineer were authorised to continue the negotiations with a view to an offer being made to the owners for the purchase of the undertaking.

United States.—A MILLION HORSE-POWER STATION.—The sixth 145,000-h.p. turbo-generator set at the Hudson Avenue generating station, Brooklyn, belonging to the Brooklyn-Edison Co., was recently brought into operation, bringing the total capacity of the station to over 600,000 h.p. The remaining space at the station is to be occupied by two 215,000-h.p. units, recently ordered from the American General Electric Co., Ltd. When these units are installed, the capacity of the station will thus be more than one million h.p.

EXTENSION OF PAUGAN STATION.—The International Paper and Power Company is to install another 34 000-h.p. generator in the Paugan, Quebec, hydro-electric plant of the Gatineau Power Company. The Paugan station will then have an installed capacity of 238,000 h.p. and will be the largest hydro-electric development of the company.

Wakefield.—LOANS.—The Corporation Electricity Committee is applying for sanction to the borrowing of £5,000 for the provision and hiring out of electrical cookers and other apparatus. Sanction has been obtained to loans of £1,750 and £850 for h.p. cable and sub-station equipment, respectively.

Walsall.—EXTENSIONS.—The Corporation Electricity Committee is to extend mains at an estimated cost, including sub-station equipment, transformer and switchgear, of £1,500.

Wimbledon.—ASSISTED WIRING SCHEME.—At a meeting of the Corporation Electricity Committee, held recently, the borough electrical engineer reported that he had received several requests for the installation of electricity on an assisted wiring basis. He proposed that such a scheme should be prepared, and stated that an expenditure of £5,000 would be necessary. The Committee agreed to the proposal.

LOANS SANCTIONED.—The Electricity Committee has obtained sanction to loans of £50,000 for mains and services; £7,000 for domestic electrical apparatus; and £5,000 for house-wiring installations.

STREET LIGHTING.—At a recent meeting of the Corporation General Purposes Committee, the borough electrical engineer, with the assistance of the General Electric Co., Ltd., gave a demonstration of the effect of central overhead street lighting as compared with the ordinary method of street lighting adopted in the borough. Alderman Russell, chairman of the Watch and Fire Brigade Committee, stated that his Committee would shortly make a recommendation for improving the lighting of Parkside by means of central overhead lighting.

Wincanton.—ELECTRICITY SCHEME.—It was reported at a recent meeting of the Rural District Council that the Wessex Electricity Co. had prepared a scheme for supplying electricity in the area between Yeovil and Frome. When wayleaves have been secured, the company is to proceed with the erection of the line and the l.p. networks in Wincanton, Castle Cary, Bruton, and some smaller villages.

Tramway and Railway Notes.

Bradford.—RAILLESS-CAR SYSTEM RECOMMENDED.—The first instalment of the report prepared by Mr. C. J. Spencer, general manager of the London United and associated tramway companies, for the Bradford Corporation Tramways, has been received by Bradford Tramways Committee. *Modern Transport* understands that the report contains a recommendation to replace the tramways with long-distance railless-car services. The cost of the tramcars per car-mile is stated to be 1s. 6½d., while that of the railless-car is slightly over 1s. 2d., nearly ½d. per mile less than petrol 'buses. The chief object of the Committee is to effect economy in administration, and about 100 employés have already been dismissed, while salary reductions and service restrictions are probable. The loss sustained by the undertaking for the year ended March 31st, 1930, was £29,962, and for the current year it is expected to be even greater.

Carlisle.—PURCHASE OF TRAMWAY.—The Ribble Motor Services Co. is negotiating with regard to acquiring the Carlisle tramway undertaking. Major Hickmott, managing director of the 'bus company, stated on December 3rd, that terms had been arranged, but legal and other formalities had to be gone through. The trams have been in operation for 30 years, and are owned by the Carlisle Transport Co. The Ribble Co. operates extensively in the North, and for some time has been running short-distance 'buses in Carlisle. If negotiations succeed, trams will be quickly replaced by 'buses, which will run over extended routes to the city boundaries.

Continental.—BELGIUM.—Following the example of Antwerp and Liège, railless cars are to be introduced in Brussels, it having been decided to adopt them on the Brussels-Auderghem-Overyssche 'bus route.

HUNGARY.—*Modern Transport* states that, in connection with plans for the electrification of the railway between Budapest and Hegyeshalom (Austrian frontier), it has been decided to rebuild the whole line between the stations Bicske and Szar. These works will be commenced during this winter.

Doncaster.—RAILLESS CARS.—The Town Council is to substitute railless cars for trams on one of its routes at a cost of approximately £20,000.

Ipswich.—RAILLESS CARS.—The Town Council is to extend its railless-car system at an estimated cost of £19,700.

London.—BREAKDOWN.—The breaking of an axle on an empty west-bound train at about 7 p.m. last Monday caused a considerable dislocation of the trains on the Central London Railway. The mishap occurred between the Tottenham Court Road and British Museum stations, and the normal service was not resumed until early on Tuesday morning.

Sunderland. — TRAMWAY EXTENSIONS. — The Corporation Tramways and Highways Committee proposes to extend its tramway system along the Whitburn Road at Seaburn to the Sunderland boundary, at an approximate cost of £8,000.

Telegraph and Telephone Notes.

Canada.—TELEGRAPHY.—In an address to the London (Ontario) branch of the Engineering Institute of Canada, Mr. R. B. Steele, assistant chief engineer of the Canadian National Telegraphs, stated that telegraph transmission at greater speed would be made possible in the near future by a further extension of the carrier-current system. In 1927 the Canadian National Telegraphs increased by means of that system the capacity of a single pair of wires from a comparatively small number of words to 4,120 words a minute; further development of the system would now increase the transmission capacity to 9,120 words a minute.—*Reuter.*

China.—CABLE COMPANIES' INTERESTS.—The spokesman of the Ministry of Communications has made a statement on the present situation regarding the negotiations between the Chinese Government and the foreign cable companies (Eastern Extension, Great Northern, and Commercial Pacific) whose contracts with China expire at the end of the year. He said that the new radio station at Shanghai made possible direct communication with America and Europe, and the Ministry had arranged for the payment of China's debt of nearly 5,000,000 dollars to the cable companies. In the event of the present negotiations breaking down, the Ministry was fully prepared to handle all outgoing and incoming messages. The issues now being discussed between the Government and the companies were: first, landing rights; secondly, the future interests of the companies in China; and, lastly, cable rates. The cable companies desired a twenty-years extension of their monopoly of landing rights, to which the Chinese Government could not agree, though it was willing to discuss a shorter period. The Government insisted that the Chinese Telegraph Administration must handle all incoming and outgoing traffic in China, to which the companies objected on the ground that the Chinese Administration would unduly favour the Chinese-owned radio station. The Government's reply was that it appreciated the importance of the cables and would protect the companies' interests. Finally, the Government was holding out for a bigger increase in the proportion of the cable revenue payable to it than the companies had yet offered.—*Reuter* (Nanking).

Finland.—TELEPHONE CONCESSION.—The Swedish Ericsson Telephone Company has applied to the Finnish Ministry of Communications for the grant of a concession for that country. The company suggests the formation of a new company with a share capital of 210 million Finnish marks, of which the existing inter-urban telephone undertaking would, it is said, subscribe 65 millions and the Finnish State 70 millions, while the balance of 75 millions would be offered for public subscription with the right of the Swedish company to take up one half. A period of 30 years is suggested as the term of the concession, at the end of which, or later, the Finnish Government would be able to take over the undertaking. In return for the concession the State would receive 3 per cent. of the new company's receipts. Finnish telephone material would be used in so far as equivalent foreign material was not at least 5 per cent. cheaper. A similar offer has been made by the German Siemens and Halske Company, although no details are available at the present.

Radio-telephony. — ANGLO-ARGENTINE SERVICE.—A direct radio-telephone service between Great Britain and the Argentine will probably begin within two or three weeks, the Postmaster-General announces. There will be land-line extensions to Uruguay and Chile. The question of a direct service to Brazil is under consideration.

CZECHO-SLOVAKIA-AMERICA SERVICE.—Direct wireless communication between Prague and New York was inaugurated on December 1st with an exchange of telegrams between President Masaryk and President Hoover.—*Reuter* (Prague).

The Telephone Service.—IMPROVED AND CHEAPENED.—The following steps, taken within the past two years, to make the telephone service more popular have been cited by the Postmaster-General in a wirtten answer to a Parliamentary question. Reductions in charges for long-distance (inland) trunk calls amounting in some cases to nearly 40 per cent. The opening of over 5,000 additional call offices in rural areas and of 3,000 kiosk call offices. The provision of many new exchanges, including 270 rural automatic exchanges, and the extension of existing exchanges. The abolition of the majority of guarantees formerly required in connection with rural call-office extensions. The extension of the "free" installation radius from 1½ to 2 miles from principal exchanges; and the reduction to the normal tariffs of rentals for circuits to small rural exchanges. The introduction of the "personal" call service; the extension of no-delay working on long-distance calls; the extension of international services, including Anglo-Australian, Anglo-South American, and services with liners at sea; and a reduction of the minimum charge for Anglo-American calls from £9 to £6. In addition, a person making a trunk call may now extend the usual three-minutes period by one-minute additions instead of having to pay for a minimum further extension of three minutes.

Radio Notes.

Bulgaria.—New Station.—It is announced that the new Sofia station is to commence regular operation quite soon.

Canada.—Licences.—Figures issued by the Dominion Government for the seven months of the present year disclose the fact that, whereas almost every other city in the Dominion recorded an increase in the number of radio receiving licences issued as compared with the whole of last year, Montreal dropped from 43,054 to 30,015. Quebec City increased, as compared with the whole of last year, from 4,256 to 7,521 licences. Toronto increased from 61,863 to 63,090. For the whole of Canada, 394,291 licences have been issued in seven months, says *World-Radio*, as compared with 423,557 licences during the whole of last year. Some 634 free licences have been issued to the blind, as compared with 589 during the whole of last year.

Germany.—Revenue.—The past year's revenue of the national radio-telephone broadcasting organisation amounted to 88 million marks, about £4,400,000.

The number of subscribers to the service totalled 3,242,000 on October 10th, 1930. The annual cost of a licence is 24 marks. —*Reuter* (Berlin).

Wave-length Change.—The Königsberg station changed its wave-length to 217 metres (1,387 kc/s) when the high-power Heilsberg station began to operate this month on Königsberg's old wave-length, *viz.*, 276·5 metres (1,085 kc/s). Both stations will transmit the same programme, and the new station's power of 75 kW is to be gradually increased to 120 kW.

Regional Interference.—German Offender.—The British Broadcasting Corporation announces that the interference with the London regional programme which has existed since November 21st has been caused by the new German station (Muhlacker) near Stuttgart. The wave-length separation between the two stations is that agreed to internationally, and both stations are operating on their correct wave-lengths. The possibility of a rearrangement of wave-lengths has been discussed with the foreign broadcasting authorities concerned. It is too early to say, however, whether a satisfactory solution can be reached in this way. Meanwhile, the German authorities have promised every possible precaution against over-modulation.

United States.—Receiving Sets.—According to the Department of Commerce, Washington, there are approximately 13,500,000 broadcast radio-telephone receiving sets in use in the United States.

Contract Information.

When "Contracts Open" are advertised in our "Official Notice" pages, the date of the Electrical Review containing the advertisement is given in parentheses below.

Contracts Open.

Australia.—Melbourne.—Posts and Telegraphs Department. January 6th. Indicators. (A.X. 10403.)* Submarine cable. (A.X. 10309.)*

January 13th. Terminal strips. (A.X. 10465.)* Four sets of echo suppressors for two-wire repeated circuits. (A.X. 10523.)*

January 20th. Telephone switchboard keys and parts, including handles, make springs, break springs, and key plates. (A.X. 10517.)*

January 27th. Fuses and heat coils for the protection of telephone equipment. (A.X. 10516.)*

February 3rd. Telephone exchange power boards. (A.X. 10466.)*

February 10th. Telephonists' telephones for common battery working. (A.X. 10569.)*

January 12th. State Electricity Commission. 44,000-V switchgear and accessories for the Belmont and Colac sub-stations. (A.X. 10543.)*

Victorian Railway Commissioners.—January 7th. Remote control circuit breakers and accessories. (A.X. 10493.)*

Denmark.—Copenhagen.—January 3rd. Municipal Lighting Department. 40,000-kVA transformers. (A.X. 10568.)*

Glasgow.—December 19th. Corporation Health Department. Electric lighting and bells at new house for medical superintendent at Ruchill Hospital. Specifications from Office of Public Works, City Chambers (deposit £2 2s.); offers to Town Clerk.

Hull.—January 19th. Corporation Electricity Department. Electric lamp posts and brackets for street lighting. (See this issue.)

London. — London County Council. — December 18th. Wiring and fittings for electric lighting in tenements at Ossulston estate, St. Pancras. (November 14th.)

December 22nd. Wiring and fittings for electric lighting in 39 blocks of tenement dwellings at the Leigham Court Road housing site, Streatham Hill. (November 28th.)

Islington.—Borough Council. December 31st. Laying of distributor cables and earthenware pipes. (See this issue.)

January 1st. Lead battery. (See this issue.)

January 16th. Twelve months' supply of electrical and engineers' stores. (See this issue.)

County of London Electric Supply Co., Ltd.—February 2nd. Coal unloading cranes and coal handling plant, including travelling bridge and belt conveyors, in connection with the Barking power station extensions. (See this issue.)

Central Electricity Board.—January 19th. Construction of site works, foundation works and buildings in connection with the North-East England Electricity Scheme. (See this issue.)

Manchester.—December 30th. Electricity Committee. A sheet steel kiosk and 6,600-V switchgear. (December 5th.)

Newcastle.—Newcastle-upon-Tyne Electric Supply Co., Ltd.—January 14th. Piping equipment for power station. (November 28th.)

New Zealand.—Wellington.—Post and Telegraph Department. January 19th. Electric lamps and condensers. (A.X. 10446.)*

January 20th. Resistance spools. (A.X. 10505.)*

January 24th. 300 four-conductor dial cords. (A.X. 10556.)*

January 26th. 500 ebonite telephone earpieces. (A.X. 10555.)*

Public Works Department. January 27th. 11,000-V switchgear and metering for Mangahao power scheme. (A.X. 10373.)*

February 24th. One set of 110-kVA outdoor switchgear, steel-work and controlling equipment. (A.X. 10507.)*

Northern Ireland.—Ministry of Commerce.—January 1st. 33-kV wood-pole overhead transmission lines. (November 28th.)

Oswestry.—December 19th. Corporation Electricity Department. Overhead l.p. distributing line; also a.c. house-service meters. (See this issue.)

South Africa.—Capetown.—January 8th. City Electricity Department. Single- and 3-phase motors of various sizes up to 10 h.p., with switchgear. (A.X. 10612.)*

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed.

Barrow-in-Furness.—Electricity Committee. Accepted:—
Electric cookers (£179).—British Electric Transformer Co., Ltd.
Six air-break type switches.—Asea Electric, Ltd.
Transformers.—Ferranti Ltd.; Metropolitan-Vickers, Electrical Co., Ltd.

Congleton.—Town Council. Accepted:—
Installation of electric lighting at the Town Hall (£194).—C. L. Whitter.

Grantham.—Town Council. Accepted:—
Installation of electric traffic signal lights (£470).—Forest City Electric Co.

Hull.—Education Committee. Accepted:—
Electric lighting at Wawne Street school (£388).—Drape and Upton, Ltd.

Leeds.—Improvements Committee. Accepted :—
Electric lighting at shops and offices in the Headrow (£1,115).—Higginbotham & Sons (in lieu of withdrawn tender).
Electricity Committee. Accepted :—
Cables : W. T. Henley's Telegraph Works Co., Ltd. (£1,087); Enfield Cable Works, Ltd. (£544); Macintosh Cable Co., Ltd. (£1,983); Derby Cables, Ltd. (£3,003); Metropolitan Electric Cable and Construction Co., Ltd. (£683).

London. — BERMONDSEY. — Electricity Committee. Recommended :—
Two 250-kVA transformers (£348).—British Electric Transformer Co., Ltd.
KENSINGTON.—Health Committee. Recommended :—
Amplifying apparatus for Argyll Hall (£175).—Standard Telephones & Cables, Ltd.
DEPTFORD.—Metropolitan Water Board. Accepted :—
Electric cable for waterworks (£68).—Edison Swan Electric Co., Ltd.
LONDON COUNTY COUNCIL.—Central Public Health Committee. Accepted :—
Conversion of five hydraulic lifts to electric drive at St. Mary's Hospital, Islington (£4,300). — Medway's Safety Lift Co., Ltd.

Oldham.—Electricity Committee. Accepted :—
Cable.—Derby Cables, Ltd.

Plymouth.—Electricity Committee. Accepted :—
Switchgear for Prince Rock station (£1,686).—A. Reyrolle and Co., Ltd.

Torquay.—Electricity Committee. Accepted :—
E.h.p. line from Dartington to Kingsbridge (£18,184).—Pirelli-General Cable Works, Ltd.

Watford.—Fire Brigade Committee. Recommended :—
Installation of the Moore and Knight fire alarm system.—Walters Electrical Manufacturing Co., Ltd.

Wakefield.—Housing Committee. Accepted :—
Electric lighting and heating at houses on Lupset estate (£158).—Walter Robb, Ltd.

Walsall.—Tramways Committee. Accepted :—
Overhead feeder cable on the Bloxwich tram route.—British Insulated Cables, Ltd.

Forthcoming Events.

Illuminating Engineering Society.—Friday, December 12th. 4 p.m. Visit to the Chiswick works of the L.G.O.C. 6.30 p.m. Holophane, Ltd., Elverton Street, Vincent Square, S.W. "Glasses for Use with Invisible (Ultra-violet and Infra-red) Rays." Dr. S. English.

Derby Society of Engineers.—Monday, December 15th. Technical College, Derby. 7.30 p.m. "Electricity from the Medical Standpoint." Mr. A. R. Lawrie.

Paisley Association of Electrical Engineers.—Tuesday, December 16th. Y.M.C.A. Board Room, Paisley. 7.30 p.m. "Circuit Breakers *versus* Fuse Protection." Mr. T. T. D. Geesin.

Association of Supervising Electrical Engineers.—Tuesday, December 16th. Junior Institution of Engineers, London. 7.15 p.m. "Electric Panel Warming of Buildings." Mr. R. Grierson.

Institution of Engineers and Shipbuilders in Scotland.—Tuesday, December 16th. Institution, Glasgow. 7.30 p.m. "Electrical Propulsion for Vessels of Moderate Power." Mr. W. H. Woolnough.

Edinburgh Electrical Society.—Wednesday, December 17th. Society, Royal Terrace, Edinburgh. "An Interlocked Railway System." Mr. P. Burns.

Overhead Lines Association.—Wednesday, December 17th. Institution of Electrical Engineers, London. 5.30 p.m. Discussion on "Weaknesses of the Present Overhead Line Regulations."

Institution of Electrical Engineers.—Thursday, December 18th. Institution, London. 6 p.m. "The Theory and Performance of Phase Advancers." Dr. J. J. Rudra and Prof. Miles Walker.

(London Students' Section).—Friday, December 12th. Institution, London. 6.15 p.m. "Laboratory Method as met with in Wireless Technique." Mr. W. D. Oliphant. Saturday, December 13th. 2.30 p.m. Visit to West Ham power station. Tuesday, December 16th. Institution, London. 6.15 p.m. Informal discussion on "Commutator *versus* Slip-ring Motors." Opened by Mr. E. J. Loveridge.

(North-Eastern Students' Section).—Friday, December 12th. Armstrong College, Newcastle-upon-Tyne. 7.15 p.m. "Insulation." Dr. W. M. Thornton.

(North-Eastern Centre).—Monday, December 15th. Armstrong College, Newcastle-upon-Tyne. 7 p.m. Informal discussion on "Heating in the Home."

(East-Midland Sub-Centre).—Tuesday, December 16th. The College, Loughborough. 6.45 p.m. "The Theory and Performance of Phase Advancers." Dr. J. J. Rudra and Prof. Miles Walker.

(Sheffield Sub-Centre).—Wednesday, December 17th. Royal Victoria Station Hotel, Sheffield. 7.30 p.m. "The Medical and Surgical Applications of Electricity." Dr. B. J. Leggett.

(Tees-side Sub-Centre).—Thursday, December 18th. Cleveland Technical Institute, Middlesbrough. 7 p.m. "Surge Investigations on Overhead Line and Cable Systems." Messrs. S. W. Melsom, A. N. Arman, and W. Bibby.

(South Midland Students' Section).—Tuesday, December 16th. University, Birmingham. 7.30 p.m. "The Relation between Engineering and Economics." Mr. F. J. Saunders.

Birmingham Electric Club.—Friday, December 19th. Grand Hotel, Birmingham. 7 p.m. Annual meeting.

British Electrical Development Association.—Friday, December 19th. Royal Society of Arts, London. 7.30 p.m. "Sales Aspects of Hotel Lighting." Mr. R. C. Hawkins.

The "Electrical Review" Service Department.

INQUIRIES must be accompanied by a stamped addressed envelope.

We shall be glad to learn the names and addresses of makers of the following devices :—

A device for lighting shop windows operated by the weight of passing pedestrians. (Said to be invented by Mr. Clifford Stanworth.)
MAGNALITE hand lamps for motor cars (lamp is fitted with a small magnet).
Water distillation plant electrically operated.

Notes.

Radio Beam-aerial Arrays.

ACKNOWLEDGMENT.—Mr. T. Walmsley's contribution on the above subject, published on pp. 974-5 last week, is of course an abstract of a paper which he read before the Wireless Section of the Institution of Electrical Engineers. The accidental omission of the customary acknowledgment is regretted.

Electrical Trades Benevolent Institution.

The publishers of the *Electrician* have very kindly arranged for the Bouverie Players to give a performance of the well-known farce entitled "Baa! Baa! Black Sheep," by P. G. Wodehouse and Ian Hay, at the Scala Theatre, London, W., on January 14th next. The entire proceeds of this performance will be handed over as a donation to the funds of the E.T.B.I., as stated in the ELECTRICAL REVIEW on November 21st (p. 885). This is to be an entirely electrical night, and it is hoped that the electrical industry will fill the house and thus make the show a thorough success.

Further particulars may be obtained from Capt. J. T. Keeping, M.C., Secretary, Electrical Trades Benevolent Institution, 9, Southampton Street, Holborn, London, W.C.1.

Traffic Direction Signs.

The Ministry of Transport announces that arrangements have been made to place on sale a pamphlet containing technical descriptions, together with full-size detailed drawings, of a number of traffic-direction signs recommended for use by the Ministry. Copies of the publication are now obtainable, price 18s. 6d. each, from H.M. Stationery Office.

Appointments Vacant.

Sales engineers in Lancashire, Yorkshire, Cheshire and North Wales for Messrs. Sadia, Ltd.
Executive engineer for the Government of Bengal.
District superintendent and also a mains assistant for the Ayrshire Electricity Board.
(See our advertisement pages to-day.)

Automatic Train Control.

A report of the Automatic Train Control Committee (1927) has been issued by the Ministry of Transport. (H.M. Stationery Office, 6d. net.)

Institution of Electrical Engineers.

In the report of the Birmingham dinner appearing in our last issue, the figures given by Mr. George Balfour, M.P., for local rates and coal cost in the year 1928-29 (£184,000 and £255,000, respectively) related to the Birmingham Corporation undertaking only.

The total amounts for the whole country are also worth noting, being approximately £3,000,000 for local rates and £6,600,000 for coal.

Fulham's Power Station.

The Electricity Commissioners announce that the public inquiry into the application of the Metropolitan Borough Council of Fulham for consent to extend their generating station in Townmead Road, Fulham, will be held on Monday, December 15th, at the Institution of Electrical Engineers, Savoy Place, Victoria Embankment, W.C.2, commencing at 10.30 a.m.

Arcing-ground Suppressors.

The incorporation of a " Petersen " suppressor in cable and overhead systems is claimed by a writer in the *Electrical World* invariably to effect immediate quenching of arcing grounds, even where the residual current assumes a value of 50 A or more. It is possible to discharge a condenser (network capacity) without re-arcing by connecting an inductance in parallel with it. The potential difference at the switching points (*i.e.*, the voltage at the point of ground for forming the arc) is a minimum when the frequency of the discharge oscillations coincides with the working frequency. The inductivity of the " Petersen " coil is so attuned that this condition obtains in the electrical circuit formed by the coil and the network capacitance.

The reduction of the capacitance earth current to 10 to 20 per cent. of its natural value and the extinguishing of the arcing ground within a few cycles reduce the number of undesirable line disconnections, compared with unprotected networks, and substantially limit transformer and line troubles, as shown by observations made in two European networks, before and after the installation of arcing ground coils.

(*a*) 22-kV, three-phase system, 50 cycles: length of network, approximately 500 km.; capacitance earth current, about 35 amperes.

Month	1923	1924
September	63	7
October	52	7
November	25	6
December	43	2
Total interruptions	183	22

(*b*) 110-kV, three-phase system, 50 cycles; length of network, about 350 km., double-circuit line. Year of observation, 1928.

(1) Service with insulated neutral, but without " Petersen " coil: of eight faults to ground, only one did not cause an interruption; *i.e.*, disturbance ratio, about 87 per cent.

(2) Service with " Petersen " coil: of nine faults to ground, only one caused interruption; *i.e.*, disturbance ratio, about 11 per cent.

The " Petersen " protection acts automatically in the event of faults and does not require the aid of relays or auxiliary spark gaps. Apart from extensive cable networks in which selective ground relays may be desirable, relays are used with this protection only for signalling purposes, *i.e.*, to ascertain which of the different high-voltage sections has developed a fault to ground. The cost of the " Petersen " protection barely amounts to 1 per cent. of the initial costs of the actual transmission line protected. (This does not apply to very-high-voltage overhead lines and to cable systems.)

I.E.E. Kindred Societies.

Now that the winter sessions of the technical institutions are well forward, it will be of interest to many electrical engineers to know the names and addresses of bodies corresponding to our own Institution of Electrical Engineers in some of the principal foreign countries.

France.—La Société Française des Electriciens, 40, Rue de Seine, Paris, 15e.

Germany.—Elektrotechnischer Verein, Potsdamer Strasse 118a II, Berlin, W.35.

Verband Deutscher Elektrotechniker, Potsdamer Strasse 68 III, Berlin, W.57.

Italy.—Associasione Elettrotecnica Italiana, Via Annunciata 4, Milano (102).

Sweden.—Svenska Teknologforeningen, Stockholm, 16.

U.S.A.—American Institute of Electrical Engineers, 33 West Thirty-ninth Street, New York.

Illuminating Engineering Society.

The Illuminating Engineering Society was registered as a company limited by guarantee, without share capital, on November 24th, with 500 members each liable for £1 in the event of winding up. The income and property of the Society, whencesoever derived, is to be applied solely towards the promotion of its objects. The word " limited " is omitted from the title by licence of the Board of Trade. The objects are to promote the general advancement of illuminating engineering, the utilisation of natural and artificial light, and the dissemination of knowledge relating thereto, &c. The management is vested in a council, consisting of the president, the past presidents of the Society or its predecessors, provided they be members of the Society, the vice-presidents, the honorary treasurer, the honorary secretary, ordinary members, not exceeding 24, and the chairman of each local centre (if any), provided he be a member of the Society. The first members are: Lt.-Col. K. Edgcumbe (president); Sir Francis Goodenough (vice-president); H. T. Harrison (vice-president); C. W. Sully (vice-president); J. W. Ife (hon. treasurer); J. S. Dow (hon. secretary); and 18 others, well known in illuminating engineering circles. The registered office is 32, Victoria Street, London, S.W.1.

Electric Street Lighting.

A letter in our " Correspondence " columns of November 12th issue, p. 934, lends additional interest to figs. 1 and 2, which show portions of a main road in the city of Salford

Fig. 1.—Road Lighted by Gas.

Fig. 2.—Road Lighted by Electricity.

lighted, respectively, by gas and electricity. The electrical installation at Salford covers a distance of approximately 20 miles. Nearly 900 " Bruce " lanterns have been supplied by the Wardle Engineering Co., Ltd.; they are situated about 40 yards apart, staggered, and suspended from the tramway span wires. The lanterns are fitted with " Holophane " dome refractors.

Cables for Electric Organs.

The electrical equipment of a modern kinema organ calls for special cable of considerable size, with a large number of conductors. Some idea of the complexity of the electrical circuits may be gathered from two recent examples of such cables made by British Insulated Cables, Ltd. In the one case there is a flexible centre core consisting of 19 groups of 11/.0092 inch plain copper wires heavily covered with cotton around which are laid 16 groups of 5/.024-inch enamelled and double-cotton-covered conductors, the whole cable being cotton taped, cotton braided, and thoroughly impregnated with paraffin wax. Each wire in the groups of fifty has a distinct and different colour. The other example consists of 30 groups

each containing 20 tinned-copper wires of 25 s.w.g., each wire being covered with cotton of different colour for identification purposes, the 30 groups then being stranded together, braided overall, and impregnated with paraffin wax.

The Electrical Association for Women.

About 140 members of the Birmingham and Midlands Branch of the E.A.W. visited the works of the Credenda Conduits Co., Ltd., at Oldbury, on November 26th. Amongst other interesting things, the members were shown the electric cooker ordered by H.M. the Queen, which is soon to be installed in Kensington Palace.

A series of talks on "Domestic Electricity," organised by the Surrey County Council Education Department, for the benefit of teachers of domestic science in the Council's secondary and other schools, were given recently by Mr. R. W. Kennedy (E.C.A.) at the Wimbledon Technical College, where a good collection of demonstration apparatus was available to increase the interest of the meetings. The Wimbledon Corporation Electricity Department also loaned equipment to illustrate the talks. Associated with the lectures, Mr. Kennedy organised a Saturday-morning tour to points of electrical interest in the central London area on November 29th, when fifty teachers attended.

On November 26th members of the North Staffordshire branch had the opportunity of hearing Mr. F. S. Ette, of the General Electric Co., Ltd., who dealt with the subject "Colour Lighting."

A meeting of ladies was held in Liverpool on December 4th, when Mr. P. J. Robinson, city electrical engineer, introduced Miss C. Haslett, director E.A.W., and explained the work and objects of the Association. The meeting decided that a Liverpool and District branch of the Association be formed, and Mrs. Frank C. Wilson, city councillor and the wife of the chairman of the Tramways and Electric Power and Lighting Committee, was elected president, and Mrs. P. L. Davies, Wayside, Menlove Gardens, Wevertree, was elected honorary secretary *pro tem.*

It is interesting to note that the first and second prizes offered at the London Bachelor Girls' Exhibition for the sponge-cake cooked in *any* stove were won by E.A.W. members, who cooked their cakes in electric ovens. The two prizes, given by the British Electrical Development Association in connection with the "Dinner For Two" competition cooked on an electric stove, have been won by Miss Dankley and Mrs. Gain.

The inaugural meeting of the Hounslow and District branch of the Electrical Association for Women was held on November 26th in The Baths Hall, Hounslow. The new branch will include Heston, Isleworth, Osterley, St. Margarets, Hounslow, Spring Grove, Chiswick, Ealing, Richmond, Twickenham, Southall, Sunbury, and any other district north of the Thames in the London and Home Counties area.

Auchinraith Colliery Explosion Inquiry.

The inquiry was resumed at Glasgow on November 27th into the causes and circumstances of an explosion which occurred at Auchinrath Colliery, Blantyre, in August last, and which resulted in the death of six men and in injuries to six others. Sir Henry Walker, H.M. Chief Inspector of Mines, presided. Mr. D. C. Gemmell, the manager of the mine, detailing the steps he took to deal with the situation when the explosion occurred, said that he had never received a deputation from the Workers' Committee about the presence of gas, but complaints had been made some years ago about ventilation. During his period of management he had overhauled and replaced the lamps with the most up-to-date type, and was encouraged by the firm in these experiments. At the time of the explosion the firemen, with one exception, were all equipped with electric cap lamps, in addition to oil flame safety lamps. Mr. H. Stoker, senior divisional inspector of mines, said his deductions were that the explosion occurred at the same time as a shot was fired, and that over 5 per cent. of gas was present. In the course of his search, witness found apparatus used for firing the shot. The end of the shot-firing cable, he observed, was lying two or three feet away from the magneto, and he thought that perhaps the cable had never been properly attached to the magneto. Mr. Stoker added that he thought that the spark ignited the gas at the mouth of the hole and not at the exploder. Dr. Wm. Payman, chief assistant of the Safety in Mines Research Board on Explosives, said that it was his opinion that the ignition of gas had not been caused by the explosion of the shot, but that it had been caused by a spark from the two wires connecting the terminals at the detonator. Dealing with the accumulation of gas in the pit, Mr. J. C. E. Hay, representing the Miners' Federation and other bodies, held that this was present because there was a deficient system of ventilation. Mr. Hugh Alexander, for the owners of the colliery, held that the proximate cause of the accident was the failure of the shot firer to carry out his statutory duties. Sir Henry Walker's findings will be announced later.

Hack-saw Blade Manufacture.

In the article in our last issue under the above heading we described the electric hardening furnaces at the works of Messrs. James Neill & Co. (Sheffield), Ltd., as being of the induction type. Messrs. Wild-Barfield Electric Furnaces, Ltd., point out that the furnaces are actually of the resistance type, and that confusion no doubt exists because the indication of the critical point is given by an e.m.f. induced in a secondary winding on the furnace when the steel is introduced into the chamber. The induced e.m.f. upsets the balance in two opposing coils, which balance is restored when the critical point is reached. It is claimed that these furnaces are the only type which give a definite indication of the exact quenching moment of steels of the class in question.

Manchester Electrical Engineers' Dance.

The annual dance of the Manchester Electrical Engineers was held on Friday last at the Midland Hotel, Manchester. The attendance was, we think, greater than usual, and the ball room was certainly full to capacity. An excellent band, a cabaret entertainment which provided some spectacular dancing, and the usual distribution of hats and favours, all helped to secure a most amusing time for all those present. Mr. Taite, Mr. Harcourt Williams, and their colleagues who must have spent much time on the preliminary arrangements, may once again congratulate themselves on having provided everyone with a thoroughly enjoyable evening.

Northampton Polytechnic Conversazione.

The annual prize distribution and students' conversazione were held on December 5th and 6th at the Northampton Polytechnic, Clerkenwell. On Friday, Mr. S. C. Laws, M.A., M.Sc., (principal) presented a report on the work of the session, and an address was given by Sir Ernest W. Petter, who afterwards distributed the prizes. The laboratories, workshops, &c., were opened to visitors for inspection, and the students gave demonstrations. During the evening an organ recital was given by Mr. S. Disher, the Polytechnic organist. Saturday's programme included an excellent promenade concert by the Polytechnic Choral and Operatic Society, and the Polytechnic orchestra, while gymnastic, badminton, boxing, and swimming displays were also given. The function was concluded with dancing.

Royal Institution.

At a recent general meeting, Sir Robert Robertson, treasurer and vice-president, in the chair, Lord Eustace Percy was unanimously elected president of the Institution in succession to the late Duke of Northumberland. The thanks of the members were returned to Major C. E. S. Phillips, secretary, for his gift of a water-colour of the Royal Institution by T. Hosmer Shepherd; to Mr. R. W. Paul and Mr. R. S. Whipple for their present of auxiliary projection apparatus for the lecture theatre; to Mr. S. G. Brown for hand-'phone equipment for the lecture theatre; to Mrs. Tyndall for a silver-plated inkstand, formerly the property of Michael Faraday; and to Mr. L. Rome Guthrie for Japanese paper for the ambulatory and for the restoration of early plans of the Institution. Mr. P. Dunsheath and Prof. A. M. Tyndall were amongst the newly-elected members.

"All-electric" Flats.

Of considerable electrical interest is the scheme of the St. Pancras House Improvement Society, Ltd., for the erection of some 400 flats in the very poor district of Somers Town, north-west London, to replace a portion of a slum area by a miniature garden city. The first block of 40 flats has been completed and was officially inaugurated on November 26th. Each flat is equipped with an electric cooker, kettle, thermostatically-controlled water heater, wash boiler, and an electric iron, and this apparatus is included as "fittings" and charged for inclusively in the rent, which is at the rate of 4s. 6d. per room, not including the kitchen and bath room. Although it will be necessary for the tenants to hire the fires separately, each room is adequately wired for heating, in addition to lighting. The decision to make the flats "all electric" was not made until after the building was started, which explains the existence of flues, but we understand that it is hoped to make considerable savings in the future development of the scheme by the omission of flues. It is interesting to note that the St. Pancras electricity undertaking has played an important part in the scheme, and that Mr. J. H. Bryan, consumers engineer, acted as consulting engineer to the Improvement Society. The undertaking supplies energy to the flats at 5½d. per kWh for lighting and ½d. per kWh for heating and cooking. The cookers were supplied by Moorwoods, Ltd., the kettles, washboilers and irons by Revo Electric Co., Ltd., and the water heaters by Geo. Nobbs, Ltd.

Electrical Benevolence.

The third electrical carnival organised by the E.D.A. in the Northern Area is to be held at the Oxford Gallaries, Newcastle-on-Tyne, from 8 p.m. to 2 a.m. on Friday, January 9th, 1931.

The objects of the carnival are to raise funds for the E.T.B.I. and the I.E.E. Benevolent Fund, and to popularise the E.D.A. in the Northern Area. Col. W. A. Vignoles and Mrs. Vignoles will receive the guests. Tickets (5s. each) may be obtained from the Area Officer, Mr. A. Parkin, Commercial Union Buildings, Pilgrim Street, Newcastle-on-Tyne.

Our Personal Column.

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements.

Mr. Henry W. Allen, who is retiring from the service of the Marconi associated companies, was presented this week with a radio-gramophone and filing cabinet with records. The Marchese Marconi, in making the presentation on behalf of the subscribers, referred to the valuable assistance rendered to him by Mr. Allen when he first visited England in 1896, and in the formation of the Wireless Telegraph and Signal Company (now Marconi's Wireless Telegraph Co., Ltd.) in the following year. On the formation of that company, Mr. Allen was appointed secretary, and he subsequently occupied the position of joint general manager and deputy managing director; and he remains a director of the Marconi International Marine Communication Co., Ltd. On the formation of the merger companies he was appointed a general manager of Imperial and International Communications, Ltd., and on his retirement accepted the position of consultant.

Mr. Donald Sinclair, A.M.I.E.E., who takes up his duties as sales manager of Britannia Batteries, Ltd., this month, has for many years been the Scottish representative of the Chloride Electrical Storage Co., Ltd. He received his technical training and served his apprenticeship in Glasgow, and for three years was engineer-in-charge of the Falls of Foyer electricity plant for the British Aluminium Co. Later, while on the electrical staff of John Brown & Co., of Clydebank, he had a wide and varied experience of marine work, and in 1906 he was appointed resident engineer for Scotland by the General Electric Co., Ltd., which post he retained for 13 years before specialising in accumulator work.

Mr. William Chamberlain, who, as we reported last week, has resigned the position of manager of the Belfast tramways to become chairman of the Traffic Commission for the north-western area, has had many years' experience with Lancashire electricity undertakings. He commenced his career in the Lancaster Corporation Electricity Department. From there he went to the Wallasey electricity works, and after being there for two years he became chief assistant electrical engineer to the Mersey Docks and Harbour Board. He joined the Oldham electricity undertaking in 1902 as mains superintendent and two years later was appointed joint electrical engineer with Mr. F. L. Ogden. Mr. Chamberlain had filled the position of tramway manager at both Oldham and Leeds before he went to Belfast at a salary of £2,250 per annum.

Major C. H. W. Edmonds, O.B.E., has been appointed commercial engineer to the Siemens and General Electric Railway Signal Co., Ltd.

Last week the Senate of the National University of Ireland conferred the degree of Doctor of Science on **Mr. J. J. Drumm,** of University College, Dublin, in recognition of his work in connection with the "Drumm" battery.

In our last issue we reported that the Hull Corporation Tramways Committee had recommended that consideration of the question of the resignation of **Mr. C. S. Rayner** (general manager), **Mr. B. J. Bruce** (rolling stock superintendent), and **Mr. Ingram,** of the Tramways Department, should be deferred for a year. The matter was further discussed by the City Council on December 4th, when the committee's recommendation was rejected, and it was decided that the three officials should be given notice terminating their engagements.

Mr. J. A. Smith has resigned from the position of manager of the Orders and Credits Department of the Marconiphone Co., Ltd., and this Department will in future be under the control of **Mr. A. L. Ball,** who has for some time past been the accountant. Mr. Smith has accepted a position with the Plessey Co., Ltd.

Mr. A. E. Hadley, managing director of the Victoria Falls and Transvaal Power Co., Ltd., has been appointed chairman of the company in succession to the Marquess of Winchester.

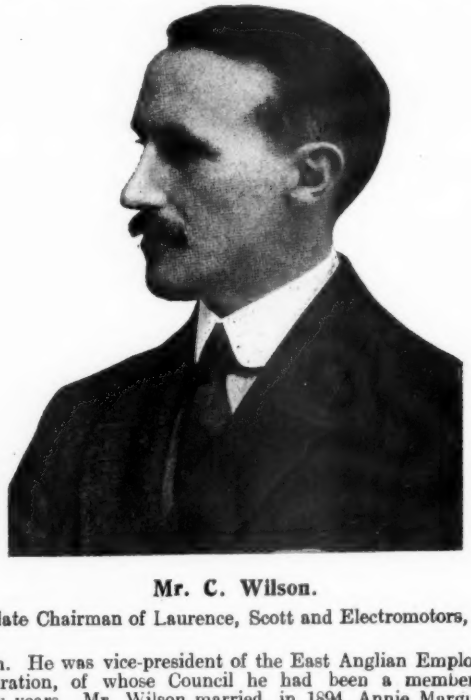
Mr. Sidney E. Garcke has been appointed to the board of the Electric and General Investment Co., Ltd., in the place of his father, the late Mr. Emile Garcke.

Mr. A. Gray, B.Sc., has joined the staff of the Central Electricity Board in Newcastle as maintenance engineer for the North-East England scheme. Mr. Gray has had a long experience with the Clyde Valley Electrical Power Co., Sir William Arrol & Co., Ltd., William Beardmore & Co., Ltd., and Brown, Boveri & Co., Ltd.

Mr. G. D. Meynell, assistant electrical engineer in the L.C.C. Tramways Department, is at present on a salary basis of £800 rising to £1,050 by annual increments of £50. The assistant electrical engineer now has additional duties to perform, and the Highways Committee recommends that Mr. Meynell's salary shall be £1,000 per annum, rising by annual increments of £50 to £1,200.

Obituary.

Mr. Cecil Wilson.—In May last it was our melancholy duty to report the death of Sir Benjamin Longbottom, the managing director of Laurence, Scott and Electromotors, Ltd. We now learn, with great regret, that Mr. Cecil Wilson, the chairman of the company, died on December 3rd, at the age of 66. Thus, within a few months, the heads of the two companies in the amalgamation which took place in 1929 have passed away. Mr. Wilson's death occurred in a London nursing home after an operation. Mr. Wilson was the son of the late Canon Wilson, of Mitcham, and Mrs. Wilson, who now lives at The Grange, Overstrand. He was educated at Rugby and started his business career at the Thames Ironworks, the last great shipbuilding yard in London to be closed. He became a director of Laurence, Scott & Co., as they then were, in the early days of electricity, and had the satisfaction of seeing this pioneer firm of electrical engineers steadily increase in size and importance. During the whole of this period he was in close association with Mr. W. H. Scott, the managing director, and on the death of his brother-in-law, Mr. Reginald Laurence, in 1924, Mr. Wilson was elected chairman of the board of directors, which position he held at the time of his death. He was vice-president of the East Anglian Employers' Federation, of whose Council he had been a member for many years. Mr. Wilson married, in 1894, Annie Marguerite Laurence, youngest daughter of the late Mr. Sidney Laurence, of Clapham Park. His family consisted of two sons and a daughter; the elder son, Mr. Laurence Wilson, served in the Norfolk Regiment during the war and died of wounds in 1915. Mr. Gerald Wilson, the second son, saw war service in the Navy, and is now a director of Laurence, Scott and Electromotors, Ltd. Mr. Wilson will be remembered by many as a man of great generosity, a quality which was only equalled by his dislike of publicity. Recently he had taken much interest in establishing the Thorpe and District Ex-Service Men's Club, of which he was president. He was also president of the Norwich Boy Scouts' Association. The funeral took place at Thorpe St. Andrew on Monday last, when, in addition to Mr. Wilson's widow, his son and other members of his family, there were present many representatives of the company, including Mr. W. H. Scott, Capt. G. J. Scott, Messrs. J. W. Kempster, S. Cozens-Hardy, and E. Greenhalgh, directors; Messrs. W. Le Fevre and T. R. Reavell, works managers at Norwich; and Major S. E. Glendenning, D.S.O., manager of the switchgear works.



Mr. C. Wilson.

The late Chairman of Laurence, Scott and Electromotors, Ltd.

Mr. E. Catley.—The death occurred on December 4th, at the age of 80, of Mr. Edward Catley, formerly superintendent engineer of postal telegraphs.

Financial Section.

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares.

New Companies Registered.

International General Electric Co. of New York, Ltd.—Private company. Registered December 8th. Capital, £100,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in all kinds of electrical and mechanical machinery, plant and apparatus, appliances for the application of any kind of electrical or other power, and supplies, lamps and fittings, wireless apparatus, valves and fittings, cables and wires, rolling stock, engines and vehicles, electrical refrigerators, and refrigerating machinery and appliances, Röntgen or X-ray instruments, etc. The subscribers are:—C. H. Minor, company director; J. F. Stewart, secretary; and V. J. Radbone, electrical engineer, all of Crown House, Aldwych, W.C.2. The first directors are to be appointed by the subscribers. Solicitor: A. R. Monks. Registered office: Crown House, Aldwych, W.C.2.

Wilkinson Eastbourne, Ltd.—Private company. Registered November 27th. Capital, £1,000 in £1 shares. Objects: To acquire the business of mechanical and electrical engineers and electrical contractors, carried on as Wilkinson & Son; and to adopt an agreement with W. G. Wilkinson and K. Wilkinson. The permanent directors are: W. G. Wilkinson and K. Wilkinson, 7, North Street, Eastbourne. Registered office: 1b, Langney Road, Eastbourne.

Lectra-Ray Products, Ltd.—Private company. Registered November 29th. Capital, £1,000 in £1 shares. Objects: To adopt an agreement with Dr. Van Vleck Co., Ltd., and G. E. Mignon, and to carry on the business of importers or manufacturers of and dealers in electrical, mechanical, chemical, and scientific apparatus, &c., dealers in novelties and proprietary articles of all kinds, &c. The directors are: G. E. Mignon, 40, Fairleigh Drive, Leigh-on-Sea, sales manager; Ada F. Earl, Hillside, Brock Hill, Wickford, company secretary. Registered office: 3, Fleet Lane, E.C.4.

Thomas S. Stout, Ltd.—Private company. Registered December 1st. Capital, £500 in £1 shares. Objects: To carry on the business of electrical and mechanical engineers, smiths, &c. The subscribers are: T. S. Stout, electrical engineer, and Mrs. F. A. Stout, 111, Loughborough Road, West Bridgford, Notts. T. S. Stout is permanent governing director. Solicitors: Day, Johnson & Boot, Nottingham.

Maintenance Contracts, Ltd.—Private company. Registered December 1st. Capital, £500 in £1 shares. Objects: To carry on the business of electricians, electrical and mechanical engineers, manufacturers of and dealers in electrical, magnetic, wireless, and other appliances and apparatus, &c. The subscribers are: A. J. Gregory, 2, Oakfield Road, Stroud Green, N.4, engineer; W. J. Webber, "Romney," Cross Road, Romford, clerk. A. J. Gregory is the first director. Registered office: 38/40, Craven Street, City Road, N.1.

Mellor & Co. (Scunthorpe), Ltd.—Private company. Registered December 1st. Capital, £500 in £1 shares. Objects: To acquire the business of an electrical engineer and contractor carried on by E. Mellor, at Scunthorpe, Lincs. The directors are: E. Taylor, Scawby, Lincs., accountant. A. B. Cannon, 22, The Link, Anlaby Park, Hull, manager. Solicitors: Wainwright, Woolfe & Co., Scunthorpe.

Batterby & Hefford, Ltd.—Private company. Registered December 5th. Capital, £4,000 in £1 shares. Objects: To acquire the business of electrical engineers and contractors carried on by G. S. Batterby and C. N. Hefford at Normanton Road, Siddals Road, and the Strand, Derby, as "Batterby and Hefford." The directors are: G. S. Batterby, The Lines, Kings Newton, Melbourne, Derbyshire, electrical engineer; C. N. Hefford, 91, Normanton Road, Derby, electrical engineer; H. J. Taylor, 51, Upper Boundary Road, Derby; J. Newbold, Guylee Cottage, Mount Pleasant, Melbourne. G. S. Batterby and C. N. Hefford are permanent directors. Solicitors: Gadsby, Coxon and Copestake, Derby.

Almeida (America), Ltd.—Private company. Registered December 5th. Capital, £300 in 10s. shares. Objects: To adopt an agreement between W. Rutherford, J. Sulzberger, G. G. Powell, Sir Arthur du Cros, A. Weinstein, B. H. Conner and H. Allen Miller of the first part, Almeida (America), Ltd., of the second part, Comte de Mieres of the third part, and Mieres, Ltd., of the fourth part, and to acquire the right to manufacture and use or sell in the United States and Canada or elsewhere any invention relating to the manufacture or use of primary and secondary electric batteries, &c. The subscribers (each with one share) are: R. Smith and E. Rutland, 2, Bond Court, E.C.4, clerks. Solicitors: Linklaters & Paines, 2, Bond Court, E.C.4.

British Lumophon, Ltd.—Private company. Registered December 5th. Capital, £1,000 in £1 shares. Objects: To carry on the business of manufacturers and retailers of goods of every description in connection with wireless telegraphy and telephony, &c. The subscribers are: A. Kinge, 26, Drakefield Road, S.W.17, clerk; E. Calder, 29, Gertrude Street, S.W.10, clerk. Registered office, 20-22, Parker Street, Kingsway, W.C.2.

Leader Radio, Ltd.—Private company. Registered December 5th. Capital, £100 in £1 shares. Objects: To carry on the business of electrical engineers and contractors, manufacturers of and dealers in electrical and wireless apparatus, &c. The subscribers are: R. Heather, 25, Joan Gardens, Chadwell Heath, electrical engineer; C. Jobson, 81, Beulah Road, Walthamstow, solicitor's managing clerk. Registered office, 53, Upper Tything, Worcester.

Filtrators, Ltd.—Private company. Registered December 4th. Capital, £1,500 in 1s. shares. Objects: To adopt an agreement with C. Hennion, to carry on any business relating to disincrustants and apparatus for use in connection with steam boilers, and to carry on the business of mechanical, electrical, hydraulic, and general engineers, &c. The directors are: C. Hennion (chairman), 8, Old Square, Lincoln's Inn, W.C.; W. E. Jardine, 25, Nevern Place, S.W.5; C. O. Fletcher, 11, Carlisle Mansions, S.W.1; A. T. Ridout, 56, Bassingham Road, Wembley; J. Paynter, 92, Muswell Hill Road, N.10. Registered office: Astor House, Aldwych, W.C.

Pneumode, Ltd.—Private company. Registered December 3rd. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers and suppliers of and dealers in electrical, telegraphic, wireless and mechanical machines, appliances and devices, &c. The subscribers (each with one share) are: A. E. Isemonger and C. P. Staples, 199, Piccadilly, W.1. Solicitors: Bartlett & Gluckstein, 199, Piccadilly, W.

Wireless Relay Services, Ltd.—Private company. Registered December 2nd. Capital, £3,000 in £1 shares. Objects: To carry on the business of electrical, radio, and general engineers, and to equip and establish stations, offices, and plants, for the purpose of receiving, transmitting, and relaying radio or wireless entertainments, &c. The directors are: S. Flowitt, White Lodge, Bessacarr, near Doncaster, accountant; F. Gledhill, Markham Moor Hotel, near Retford, C.A.; C. Hardy, 10, Raven Crescent, Dewsbury, radio engineer; R. Pickard, 438, Street Lane, Leeds, piano merchant. Registered office: 8, St. Sepulchre Gate, Doncaster.

H. M. Taylor & Co., Ltd.—Private company. Registered December 1st. Capital, £1,200 in £1 shares. Objects: To carry on the business of electricians, mechanical engineers, and manufacturers, &c. The subscribers (each with one share) are: A. J. Smith, 8, Anns Court, Kinnerton Street, S.W.1, secretary; F. G. Sargent, 10, Goldsmith Avenue, Manor Park, accountant. The first directors are to be appointed by the subscribers. Secretary: L. V. Russell. Registered office: 86/88, Queen Victoria Street, E.C.4.

Rugby Electrical Engineering Co., Ltd.—Private company. Registered December 2nd. Capital £1,500 in £1 shares (1,000 7 per cent. cumulative preference and 500 ordinary). Objects: To carry on the business of electrical engineers, wireless and mechanical engineers, contractors and merchants, dealers in electrical fittings, &c. The directors are: R. J. Phennah (permanent managing director) and Mrs. Ruby G. Phennah, 4, Regent Place, Rugby.

J. J. Marr & Co., Ltd.—Private company. Registered December 3rd. Capital, £500 in £1 shares. Objects: To acquire the business of an electrical engineer now carried on by E. C. Marr at 18, Moorfields, Liverpool, as "J. J. Marr and Co." The directors are: E. C. Marr and Edith L. Marr, 31, Marlowe Road, Wallasey. Registered office: 18, Moorfields, Liverpool.

Clements Gas Consumers' Association, Ltd.—Private company. Registered December 3rd. Capital, £8,000 in £1 shares. Objects: To carry on the business of gas and electrical engineers as formerly carried on by G. B. Clements at 105, Horseferry Road, Westminster, and that of electricians, mechanical engineers, manufacturers of and dealers in gas and electrical appliances, &c. The directors are: G. B. Clements, 35, Allison Grove, Dulwich Village, S.E.21; and S. Evered, 25, Highfield Road, Edgbaston, Birmingham, engineers. Solicitors: White & Dobb, 2, Stone Buildings, W.C.2.

Official Returns of Electrical Companies.

General Electric Co., Ltd.—Satisfaction to the further extent of £2,079,260 on or before November 26th, 1930, of trust deed dated July 22nd, 1921, and registered July 26th, 1921, securing £3,500,000 mortgage debenture stock.

Stewards Electrical Co., Ltd.—Particulars filed of £600 debentures authorised November 10th, 1930, charged on the company's undertaking and property, present and future, including uncalled capital, the whole amount being now issued.

Culm Valley Electric Supply Co., Ltd.—Capital, £50,000 in ordinary shares of £1 each. Return dated June 9th, 1930. 16,490 ordinary shares taken up. £10,900 paid on 10,900 ordinary shares. £5,590 considered as paid on the remainder. Mortgages and charges, nil. Returns of allotments made up to September 26th, 1930, show a further 23,510 shares allotted, payable in cash and fully called up.

Wells, Rayner & Co. (1919), Ltd.—Capital, £2,000 in £1 shares. Return dated December 31st, 1929. 558 shares taken up. £558 paid. Mortgages and charges, nil.

Radiovim, Ltd.—Capital, £1,500 in £1 shares. Return dated July 7th, 1930. All shares taken up. £1,500 paid. Mortgages and charges, nil.

West India and Panama Telegraph Co., Ltd.—Capital, £2,445,630 in 34,563 first preference, 10,000 second preference and 200,000 ordinary shares of £10 each. Return dated July 24th, 1930. 34,563 first preference, 4,669 second preference, and 88,321 ordinary shares taken up. £1,275,530 considered as paid. Mortgages and charges, £89,100.

Bourton-on-the-Water Electric Light & Power Co., Ltd.—Satisfaction to the extent of £300 on March 21, 1930, of mortgage dated February 5th, 1915, and registered February 10th, 1915. (Notice filed November 25th.)

Magnus Volk, Ltd.—Capital, £5,000 in £1 shares. Return dated September 29th, 1930. 4,102 shares taken up. £102 paid. £4,000 considered as paid. Mortgages and charges, nil.

Alliance Electrical Co., Ltd.—Capital, £10,000 in £1 shares. Return dated August 22nd, 1930. 3,854 shares taken up. £1,927 (10s. per share) paid. £1,927 (10s. per share) considered as paid. Mortgages and charges, nil.

Electrodes, Ltd.—Capital, £500 in £1 shares. Return dated September 23rd, 1930. 53 shares taken up. £53 paid. Mortgages and charges, nil.

Cooke & Stevenson, Ltd.—Capital, £1,000 in £1 shares. Return dated May 10th (filed November 4th), 1930. All shares taken up. £1,000 considered as paid. Mortgages and charges, nil.

Furneaux & Thomas, Ltd.—Satisfaction to the extent of £400 on September 5th, 1930, of debenture for £800 authorised July 16th, 1929, and registered July 23rd, 1929. (Notice filed November 26th.) Debenture dated November 5th, 1930, to secure £500, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: J. Thomas, Velindre, Kidwelly, Carmarthen.

Lamp Caps, Ltd.—Capital, £50,000 in £1 shares. Return dated August 21st, 1930. All shares taken up. £50,000 paid. Mortgages and charges, nil.

Eastern and South African Telegraph Co., Ltd.—Capital, £600,000 in £10 shares. Return dated July 24th, 1930. All shares taken up. £600,000 paid. Mortgages and charges, nil.

S. A. Cutters, Ltd.—Capital, £3,000 in 1,000 preference and 2,000 ordinary shares of £1 each. Return dated October 6th, 1930. 2,000 ordinary shares taken up. £1,000 paid. £1,000 considered as paid. Mortgages and charges, nil.

Radielle Co., Ltd.—F. J. Parsons, Austin Friars House, Austin Friars, E.C.2, ceased to act as receiver and/or manager on November 21st, 1930.

Mills English Engineering Co., Ltd.—W. R. Thomas, 59 and 60, Wind Street, Swansea, ceased to act receiver and manager on November 24th, 1930.

M. Coquantin & Co., Ltd.—Satisfaction to the extent of £5,000 on November 11th, 1930, of debenture dated July 8th, 1927, and registered July 18th, 1927.

City Notes.

Woking Electric Supply Co., Ltd.

Last week the company published a prospectus offering for subscription 25,000 7 per cent. "B" cumulative preference shares of £1 each at £1 3s. 6d. per share, and 25,000 10 per cent. "C" cumulative preference shares of £1 each at £1 12s. 6d. per share. The present share and debenture holders are given priority. Applications are to be for equal amounts of both classes, and the list is to close on or before December 17th. The company has an authorised capital of £225,000, and this offer raises the issued capital to £198,978; the loan capital outstanding amounts to £104,770. The company has a 7,000-kW station, and its business has shown steady progress. The ordinary dividends for the past three years have been as follows:—1927, 10 per cent.; 1928, 7½ per cent.; and 1929, 8 per cent., all free of tax. In 1928 there was a bonus issue of four ordinary shares for each five held. The object of the present issue is "to enable the company to make preparations for receiving a bulk supply from the Joint Electricity Authority, necessitating additional cables, switchgear, transformers, &c., and to cope with the growing demands in the various parts of the company's area, as well as to pay off the bank overdraft."

British Aluminium Co., Ltd.

On Tuesday last this company published a prospectus offering for subscription £2,500,000 of 5 per cent. first mortgage debenture stock at 98½ per cent. The proceeds of the issue and of an issue of 700,450 6 per cent. £1 preference shares made last month are to be applied in redeeming the company's outstanding prior lien debentures and debenture stock (£1,237,509), in financing the extension of the Lochaber hydro-electric works, and for other requirements of the company. It was stated in the prospectus that the first stage of the Lochaber works has been completed, and operations were commenced at the end of 1929. The plant in operation develops 33,000 e.h.p. The complete scheme is calculated to develop continuously up to about 100,000 h.p. and to treble the present output of aluminium from these works. It was shown that the company had regularly paid 10 per cent. upon its ordinary shares since 1924, and for 1925 there was also a bonus of 2½ per cent. Owing to over-subscription, the lists were closed early on Tuesday morning.

Sun Electrical Co., Ltd.

On Wednesday last this company published a prospectus offering for subscription 60,000 7½ per cent. cumulative preference shares of £1 each at par. The company has an authorised capital of £250,000, half preference and half ordinary. Of this, £105,658 in preference shares and £93,311 in ordinary shares has been issued or agreed to be issued. The company was formed in 1899 and is one of the largest electrical wholesale concerns in this country; it has branches at Leeds and Newcastle-upon-Tyne and various agencies in other towns. An ordinary dividend of 12½ per cent. has been paid in each of the past five years, and an increasing amount has been transferred to reserve. The company's assets are valued at £219,000 net. The issue has been taken over by the Gresham Trust, Ltd., and the list was to close on or before Monday next, December 15th. The proceeds of the issue are required for the acquisition of new property and the financing of extensions to cope with expanding business.

Tube Investments, Ltd.

The annual meeting of this company, which holds all the capital of Simplex Conduits, Ltd., and the Credenda Conduits Co., Ltd., among other companies, was held on December 3rd. In the course of his speech Mr. A. Chamberlain (chairman) said that their tube-making operations covered only a small range of the total tube trade, and their activities extended into many other trades. Their portion of the tube trade had not been so hardly hit by ruling conditions as that of the bulk of the trade. During the year the share capital had been twice increased—once to provide for the taking over of the Talbot-Stead Tube Co., Ltd., and once to implement the agreement made with Stewarts & Lloyds, Ltd.

Bogota Telephone Co., Ltd.

The *Financial News* reports that at the annual meeting on December 3rd Sir Alexander Roger (chairman) explained that the presentation of accounts for the six months' period had been rendered necessary in view of the change in the company's financial year. The capital expenditure showed a reduction proportionately compared with last year, when the figure was unusually high owing to the cost of the extension to the Bogota central exchange. The profit for the half-year to December 31st last was £5,296, and, with the addition of the balance brought forward, made a total of £10,531.

S. Smith & Sons (Motor Accessories), Ltd.

The report for the year ended August 2nd last shows a trading profit of £140,183, to which is added £47,368 brought in, making £187,551 available. After deducting depreciation, interest, &c., it is proposed to pay total dividends of 12½ per

cent. on the preferred ordinary and 18¾ per cent. on the deferred ordinary shares (against 17½ and 37½ per cent., respectively), to write £5,400 off patents, to place £23,417 to general reserve, and to carry forward £42,598.

Beaver Trust, Ltd.

In the course of his speech at the annual meeting on December 2nd, Mr. J. G. B. Stone said that like many investment trust companies similarly placed, the value of their investments had depreciated. Their interest in the Foundation Co., and through that company in the Punjab Pulp & Paper Mills, had proved to be the most unsatisfactory individual investment the Trust had ever made. On the retirement of Mr. A. W. Tait, chairman of the Foundation Co., he (Mr. Stone) became chairman of the board. Many large contracts were obtained and successfully completed. In the early autumn of 1929, when the financial world crashed both here and in America, several large contracts were running in this country, in Australia, and in India. The company's inability to obtain payment for work done and to finance these contracts at the time led to the appointment of a receiver and the liquidation of the Foundation Company.

Cape Electric Tramways, Ltd.

The report for the year to June 30th last states that the entire control and management of the company's affairs has been transferred from London to Cape Town. The profit for the year was £39,091 (against £32,755) and £96,940 is brought forward. After meeting debenture interest and placing £10,000 to reserve for depreciation, it is proposed to carry forward £46,631. While existing conditions continue the directors propose to conserve resources and are unable to recommend payment of a dividend.

Burndept Wireless (1928), Ltd.

The second annual meeting has been called for to-day (Friday) in order to comply with the Companies Act, 1929. It is, however, not proposed to transact any business. The shareholders will be asked to agree to an adjournment until towards the end of this month, by which time it is expected that the accounts for the year ended June 30th last will be in their hands.

Manx Electric Railway Co., Ltd.

The gross receipts for the year ended September 30th were £35,345, as compared with £43 535 in the previous year, and expenditure was £20,777 (£31,642), leaving £4,568 (£11,893), to which is added £3,493 brought in, making £8 061 available. Debenture interest absorbs £8,269, a debit balance of £208 being carried forward.

Vera Cruz Electric Light Power & Traction Co., Ltd.

The gross income for the year ended December 31st, 1929, was £20,371, and after providing for debenture interest, &c., there is a balance of £7 575, from which is deducted a debit balance of £7,423 brought in, leaving a balance of £152 to be carried forward.

Agricultural & General Engineers, Ltd.

The total receipts for the year to March 31st last increased from £53,495 to £99,914, and after charging administrative expenses and interest, there is a net profit of £51,381 (against £1.038), which is carried forward in view of the industrial position.

Canadian General Electric Co., Ltd.

A dividend is announced on the common stock of 75 cents per share, for the three months ending December 31st, being at the rate of 6 per cent. per annum, together with an extra dividend of $1 per share.

Callender's Share & Investment Trust, Ltd.

The revenue for the year to August 31st last was £41,548, as compared with £45.598 in the preceding year, and the net profit was £33,177 (£37,219). A dividend of 20 per cent. is recommended (same) and £43,404 is carried forward.

Petters, Ltd.

An interim dividend has been declared on the 7½ per cent. cumulative preference shares for the half-year ended September 30th, less tax.

Pennsylvania Water & Power Co.

A dividend of $¾ has been declared on the common shares for the quarter ending December 31st (same).

American Telephone & Telegraph Co.

The regular quarterly dividend of $2.25 per share of stock has been declared.

East African Power & Lighting Co., Ltd.

An interim dividend is announced of 3 per cent. (same), less tax.

Cia. Hispano-Americana de Electricidad.

An interim dividend is announced of 7 per cent. gold.

Melbourne Electric Supply Co., Ltd.

A final dividend of 5 per cent. (actual), tax free, has been declared on the ordinary stock.

Postal Telegraph & Cable Corporation.

The regular quarterly dividend of 1¾ per cent. is announced on the 7 per cent. non-cumulative preferred stock.

Stocks and Shares.

TUESDAY EVENING.

THE general tendency of Stock Exchange markets remains a little uncertain. Financial troubles in Paris came to a head at the end of last week, and several weak positions had to be taken over by hands capable of nursing the stocks and shares involved. This had its repercussion in London, nor has the situation been helped by further flatness in New York. Business is meagre, and Stock Exchange markets are already indulging in a certain amount of mild relaxation during the afternoons. Several new issues have recently made their appearance, and, in spite of the fact that the window-dressing season is near at hand, other ones are expected to be made during the course of the next week or so.

Gilt-edged Stocks.

Steady absorption of the recently-issued Central Electricity Board 4½ per cent. stock is in progress. There is £10,000 of the stock on offer at 95¾, at which the yield is £4 14s. per cent. on the money. Allowing for repayment at 100—the stock is dated 1951-1973—the return is raised to 4½ guineas per cent., assuming redemption at the latter of the two dates. No interest is payable until July 1st next year, when £1 10s. per cent. will be distributed. The stock can be bought as provisional scrip, free of stamp and fee, and the price asked for it represents a premium of 5s. per cent. on the issue figure. About £10,000 G.E.C. 5 per cent. mortgage debenture stock is obtainable at 102, the return in this case being £4 18s. per cent., and the first interest being a partial amount due on March 31st, 1931. London Power 5 per cent. redeemable debenture stock costs 103¾, with interest payments due on the 1st April and October. The yield comes to £4 16s. 3d. per cent. Obtainable free of stamp duty, there is £10,000 North-West Midlands Joint Electricity Authority 5 per cent. stock, 1950-1970, offered at 102½, ex the interest payment due on January 1st next, and giving a yield of £4 17s. 6d. per cent. Another stock which can be bought free of stamp is £5,000 South London Electric Supply 4½ per cent. debenture, offered at 95½, and paying £4 14s. 3d. per cent. In this case, the first interest payment is due to be made on June 15th next, when a full half-year's interest falls due. Of Yorkshire Electric Power 5 per cent. debenture stock, £1,000 is on offer at 105, May and November interest. This gives a yield of 4¾ per cent. on the money. The amount required to meet the interest-service of this issue is £27.500 per annum, and on last year's profits there was approximately £360,000 available.

Electricity Supply Shares.

Westminster Electric ordinary have strengthened to 29s., and City of London ordinary to 36s. 3d. In the provincial list, Bournemouth & Poole are better at 3¼. Last week's rises in Metropolitan ordinary, London Electrics, Bromptons, Charing Cross, and Chelseas are all maintained. Newcastle-on-Tyne ordinary eased off to 24s. 6d., County of London to 49s. 6d. Isle of Thanet preference are 9d. higher at 25s. The general tendency of the market is firm, and prospective buyers of ordinary shares are liable to find themselves limited to those in the provincial companies. There are, however, 500 Chelsea ordinary offered at 28s., 500 London Electrics at 33s. 6d., and 500 County of London at 49s. 6d. In addition to these, 1,000 North Metropolitan Electric ordinary came on offer at 49s 9d., giving a return, on the basis of the 10 per cent. dividend paid for some years past, of £4 0s. 3d. per cent. Several hundred Electric Supply ordinary are obtainable at 49s. 3d.

Cables and Wireless.

Cables & Wireless 5½ per cent. preference has gained a point at 73¾. Both the ordinary stocks, after a moderate rise, went back to their last week's quotations. The market reports a little demand for the preference stock on the part of investors prepared to take a measure of risk in order to secure the yield of a shade over £7 7s. per cent. which the stock offers at the present quotation. Globe Telegraph & Trust ordinary recovered 2s. 6d. after their sharp fall of last week. The price is now 13¼. In the trans-Atlantic group, Anglo-American Telegraph deferred is better at 26; American Telephone & Telegraph stands at 190; and International Telephone and Telegraph is weak at 26½.

Marconi Marine shares are a firm market, and, amidst the dulness shown by industrials as a whole, the rise in the price of the shares to 40s. is the more noticeable. The company is doing well, and although no immediate increase in the 15

per cent. dividend is regarded as probable, the shares at the present price give a useful return on the money—the same yield, in fact, as that provided by Cables & Wireless preference. There is a good deal of business being done in the shares, and the market may be technically described as a good one.

Home Railway Stocks.

Hopes that the threatened possibility of a strike may be averted in the coal mining and some of the other essential industries are responsible for improvements in home railway stocks. In the advance, Underground Electric income bonds have moved up 1½ to 105½. Metropolitans and Metropolitan Districts are both 10s. higher, at 69½ and 77, respectively. Districts give a yield of 6½ per cent., and on Metropolitans the purchaser receives 5¾ per cent. In the latter case, it is fairly generally conceded that the dividend in respect of the current twelve months is likely to be increased from the 4 per cent. paid for 1929. The Central London stocks retain their firmness. There is on offer £25,000 City & South London Railway 4½ per cent. 1942-1972 debenture stock at 100⅜. The stock is unconditionally guaranteed by the Government under the Trades Facilities Acts. The first interest payment is due next July. The yield comes to £4 9s. 6d. per cent., allowing for the small loss on redemption at 100, and estimating 31 years as the probable life of the issue.

New York Depression.

The New York Stock Exchange has been in unhappy case, having to face a good deal of liquidation. The result is seen in falls amongst various utility issues, and the electrical power companies' shares have not escaped from the atmosphere of depression that has weighed down prices. Shawinigan Water and Power shares are quoted at 54½. Canadian Power common at 155. The last bargain marked in the latter was at 161¾, a couple of months ago. Consolidated Gas & Water of Baltimore have gone back to 90: Power Corporation of Canada to 57; and Canadian General Electric to 61. City Services preferred shed 8 points, falling to 77½. Pennsylvania Water weakened to 57½.

Edison Swan Cables.

A rise of 5 points has to be noticed in Edison Swan 5 per cent. debenture stock. This lifted the price to 94½, and the reason may probably be found in the fact that some such advance was overdue; though, with no business to test the quotation, the latter remained nominally unchanged. Within the last week or so, however, £125,000 of 5½ per cent. guaranteed first mortgage debentures in Edison Swan Cables, Limited, has been placed, the starting price being 100½ free of stamp. The principal, interest and sinking fund are unconditionally guaranteed by the Edison Swan Electric Co., Ltd., and no doubt there were inquiries as to why Edison Swan 5 per cent. debentures should be standing at 89½, giving a return of over 5½ per cent. on the money, if Edison Swan Cables debentures should be worth 100½. The Edison Swan Cables debentures have proved a popular investment, and the price is now 101, free of stamp.

Manufacturing and Equipment.

British Aluminium ordinary shares have gone back to 33s., in consequence of the issue of 2½ million pounds of 5 per cent. first mortgage debenture stock, offered at 98½. The yield is £5 1s. 6d. per cent. outright, plus a few pence per cent. by taking into account redemption at the final date of 1973. The company reserves the option to repay the bonds earlier, and, if this is exercised, holders will rank for 103 until January, 1951. Enfield Cable shares are better at 4 5/16, and Johnson & Phillips strengthened to 36s. 9d. Siemens ordinary have come to the fore, advancing to 22s. 6d., at which price the return is £6 13s. 4d. per cent. Crompton Parkinson ordinary dropped to 21s. 3d. The list as a whole is steady.

Foreign Tramways.

Anglo-Argentine Tramways first and second preferences are very flat, the former showing a fall of 3s. 9d., and the latter one of 7s. 6d. These declines point to acute apprehension that the dividend on the second preference will be passed, and that the first preference dividend is none too well secured under present conditions. Brazilian Tractions are 1½ lower at 25. Mexico Tramways 5 per cent. bonds rose 3 to 62. The price of the common stock is about 10, though it is doubtful whether a seller would get anything like as much. Brazilian Traction 6 per cent. preference shares, by the way, stand nominally at 90; the last recorded bargain done in the Stock Exchange was at 115¼, on September 26th.

The Indian Round Table Conference has underlined the strong recommendations made previously by the Simon Commission in regard to the advisability of separating Burma from India. If this should take place, it will have the effect of quickening interest in Burma's stocks and shares. Rangoon Tramways preference shares are quoted at £1, and the company's 5 per cent. debenture at 87½, the ordinary being 33s. 9d. The last-named are the old issue, the new shares standing about 3s. less. Of the Indian shares, Madras Electric Trams are better at 5½, and the debenture stock is up to 75½.

Share List of Electrical Companies.

	Nom.	Approx. Dividend. 1928.	1929.	Price Dec. 9 1930.	Rise or fall	Yield p.c.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	£ 1	15	15	3½	+1/16	4 16 0
Brompton Ordinary	1	8½	8½	27/6	—	5 1 10
Charing Cross Ordinary	1	8½	8½	29/-	—	4 16 7
do. do. 4½% Pref.	1	4½	4½	18/-	—	5 0 0
Chelsea	1	8½	8½	27/6	—	5 1 10
City of London	1	10	10	36/3	+1/16	5 10 8
do. do. 6% Pref.	1	6	6	23/6	—	5 2 2
Clyde Valley	1	8	8	36/3	—	4 8 3
County of London	1	7	10	49/6	—6d.	4 1 0
do. do. 6% Pref.	1	6	6	24/6	—	4 18 0
Edmundsons' 7% Pref.	1	7	7	25/6	—	5 9 10
Elec. Supply Corporation	1	11	11	48/9	—	4 10 0
Kensington Ordinary	1	8	8	27/6	—	5 1 10
Lancs. Light and Power	1	7½	7	25/6	—	5 9 10
London Electric	1	8½	9	33/-	—	5 9 1
Metropolitan	1	9	10	2¾	—	4 10 6
do. 4½% Pref.	1	4½	4½	17/6	—	5 2 10
Midland Counties	1	6½	7	28/6	—	4 18 3
Mid. Elec. Power	1	15	8	31/3	—	5 2 5
Newcastle-on-Tyne Ordinary	1	6	6	24/6	—6d.	4 18 0
do. 7% Pref.	1	7	7	27/6	—	5 1 10
Notting Hill 6% Pref.	10	6		10½	—	5 11 4
North Met. Elec. 6% Pref.	1	6	6	23/6	—	5 2 2
St. James' and Pall Mall	1	8	8	28/-	—	5 0 0
Scottish Power	1	8	8	30/-	—	5 6 8
South London	1	8½	8½	27/-	—	5 3 8
Urban Ordinary	1	7	7	29/6	—	4 15 0
Westminster Ordinary	1	8½	8½	29/-	+6d.	4 16 7
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	25/6	—	5 17 8
Yorkshire Elec.	1	8	8	34/6	—	4 12 9
HOME RAILS.						
Central London Ord. Assented	Stock	4	4	79	—	5 0 9
Metropolitan	,,	3½	4	89½	+½	5 15 2
do. District	,,	4	5	77	+½	6 9 10
Underground Electric	£1	7	8	24/6	—	6 10 8
do. do. Income	Bonds	6	6	105½	+1½	5 13 9
TELEGRAPHS AND TELEPHONES.						
Anglo-Am. Tel. Pref.	Stock	6	6	103	—	5 16 7
do. Def.	,,	1½	1½	26½	+¾	5 14 5
Automatic Telephone	1	10	12½	36/3	+1/16	6 18 1
Cables & Wireless 5½ Pref.	Stock	—	5½	73½	+1	7 9 8
do. A 7½ Ord.	,,	—	—	23½	+1	... ...
do. B Ord.	,	—	—	12	—	... ...
Globe Tel. and T. Ord.	10	10	10	13½	+½	7 8 2
do. do. Pref.	10	6	6	10½	—	5 11 7
Great Northern Tel.	10	20	20	30	—	6 18 4
Marconi-Marine	1	12½	15	2	+1/16	7 10 0
Oriental Telephone Ord.	1	12	12	25	—	*5 1 1
HOME AND FOREIGN TRAMS, &c.						
Anglo-Arg. Trams First Pref.	£ 5	5½	5½	11¼	—3/16	... ...
do. do. 2nd Pref.	5	6	6	1½	—¾	... ...
do. do. 5% Deb.	Stock	5	5	50½	—	9 19 0
British Electric Traction Def. Ord.	,,	5	5	142/6	—	... ...
do. do. Pref. Ord.	,,	8	8	127½	—	6 5 6
Brazil Traction	100	7	8	25	—1½	... ...
Brit. Columbia Elec. Rly. Pcs.	Stock	5	5	96½	—	5 3 7
London & Sub. Trac. 5% Pref.	1	Nil	Nil	11/6	+6d.	... ...
London United Tram Deb.	Stock	4	4	54½	—	7 6 10
Mexico Trams, 5% Bonds	—	5	5	62	+3	8 1 4
Mexican Light Common	100	Nil	Nil	50½	—	... ...
do. 7% Pref.	100	7	7	71	—2½	9 8 0
do. 1st Bonds	—	5	5	78	—	6 8 3
Victoria Falls Ord.	1	15	15	58/9	—	5 2 0
Yorkshire (West Riding)		Nil	Nil	5/3	+3d.	... ...
MANUFACTURING COMPANIES.						
Assoc. Elec. Ord.	1	6	6	42/-	—	5 9 1
Babcock & Wilcox	1	18	15	52/6	—	*5 14 8
British Aluminium Ord.	1	10	10	33/-	- 9d.	6 1 3
British Insulated Ord.	1	15	15	3½	—	4 12 4
Brush Ord.	Stock	10	10	105	—	9 10 6
Callenders	1	15	15	3½	—	4 16 0
do. 6½% Pref.	1	6½	6½	25/-	—	5 4 0
Crompton Parkinson Ord.	£/-	—	80	21/3	—6d.	7 1 9
do. 8% Pref.	1	8	8	26/3	—	6 2 0
Edison-Swan 1st. Pref.	1	7½	7½	22/9	—	6 6 4
do. 5% Deb.	Stock	5	5	94½	+11	5 5 10
Electric Construction	1	5½	5	12/-	—	8 6 8
Enfield Cable Ord.	1	20	25	4⅝	+1/16	5 16 8
English Electric	1	Nil	Nil	11/3	—	... ...
do. do. Pref.	1	8	Nil	10/-	—	... ...
Ferranti Pref.	1	7	7	21/-	—	6 18 4
G.E.C. Pref.	1	6½	6½	76xd	—	5 2 0
do. Ord.	1	10	14	47/6	—	5 17 11
Henley	1	25	80	6	—	5 0 0
do. 4½% Pref.	5	4½	4½	4½	—	5 6 0
India-Rubber	1	Nil	Nil	6/9	—	... ...
Johnson & Phillips	1	10	10	36/9	+1/9	5 8 10
Siemens Ord.	1	7½	7½	11½	+1/16	6 13 4
Telegraph Construction	19	10	10	17½	—	*6 18 0

* Dividends paid free of Income Tax.

Italian Foreign Electrical Trade.

Imports and Exports in 1928 and 1929.

THE following statement, showing the imports into and exports from Italy of electrical goods during 1929 has been compiled from the recently-issued official trade statistics. The figures for 1928 are added for purposes of comparison and notes of any increases or decreases are made :—

Imports.

	1928. Quintals.	1929. Quintals.	Inc. or dec. Quintals.
Electric generators and motors—			
Total	26,400	21,500	− 4,900
From Austria	500	600	+ 100
,, Germany	9,600	9,800	+ 200
,, Great Britain	400	680	+ 280
,, Switzerland	2,200	2,500	+ 300
,, Hungary	3,100	1,300	− 1,800
,, United States ...	900	1,200	+ 300
Static transformers—			
Total	3,400	4,900	+ 1,500
From Austria	100	70	− 30
,, Germany	1,000	2,800	+ 1,800
,, Germany (Reparation account)	10	100	+ 90
,, United States ...	60	380	+ 320
Electricity meters—			
Total	2,800	2,200	− 600
From Germany	2,600	1,900	− 700
,, Switzerland	50	35	− 15
Ammeters and other electrical instruments	280	370	+ 90
**Telegraph and telephone apparatus—*			
Total	8,900	16,500	+ 7,600
From Germany	3,400	6,400	+ 3,000
,, Germany (Reparation account)	330	—	− 330
,, United States ...	980	3,900	+ 2,920
,, Belgium	740	700	− 40
Carbons, electric—			
Total	37,000	44,000	+ 7,000
From Germany	24,000	25,000	+ 1,000
,, Jugo-Slavia	700	6,700	+ 6,000
,, United States ...	10,600	9,600	− 1,000
Insulators, porcelain, &c.—			
Total	4,200	1,900	− 2,300
From Germany	1,400	800	− 600
,, United States ...	50	80	+ 30
,, France	2,060	1,000	− 1,060
Accumulators—			
Total	2,100	5,900	+ 3,800
Magnetos—			
Total	640	780	+ 140
Other electrical apparatus and parts—			
Total	25,000	23,000	− 2,000
From France	3,500	1,700	− 1,800
,, Germany	8,600	9,200	+ 600
,, Germany (Reparation account)	730	20	− 710
,, Switzerland	1,500	1,500	—
,, United States ...	1,700	2,600	+ 900
,, Great Britain ...	6,000	7,000	+ 1,000
Electric lamps—			
Total (thousands) ...	19,300	15,500	− 3,800
From Austria	1,700	937	− 763
,, Germany	6,300	7,210	+ 910
,, Holland	9,700	4,524	− 5,176
,, Switzerland	430	139	− 291
,, Hungary	704	1,395	+ 691
Insulated electric wire or cable, covered with rubber or textiles	1,700	1,300	− 400
Ditto, armoured, including submarine cables	2,900	2,300	− 600

Exports.

	1928. Quintals.	1929. Quintals.	Inc. or dec. Quintals.
†*Insulated electric wire or cable, covered with rubber or textiles*	3,900	4,700	+ 800
†*Ditto, armoured, including submarine cables*	40,000	37,000	− 3,000
Electric generators and motors—			
Total	16,700	27,900	+11,200
To Belgium	580	780	+ 200
,, France	570	1,440	+ 870
,, Spain	1,200	1,600	+ 400
,, India	3,800	5,200	+ 1,400
,, Argentina	3,900	7,800	+ 3,900
,, Brazil	2,400	3,600	+ 1,200
Static transformers	870	2,600	+ 1,730
Accumulators	3,150	1,700	− 1,450
Magnetos	130	170	+ 40
Electricity meters	110	160	+ 50
Telegraph and telephone apparatus	290	250	− 40
Radio apparatus	360	320	− 40
Insulators, porcelain, &c. ...	2,700	3,300	+ 600
Lamps—			
Total (thousands) ...	1,856	2,450	+ 594

* Including radio apparatus, 3,100 q. in 1928, and 9,600 q. in 1929.

† Principal destinations : Argentina, Brazil, Cuba, and Mexico in 1929, and Argentina, Russia, Brazil, and Peru in 1928.

The Uruguayan Market.

A D.O.T. Report.

THE Department of Overseas Trade has published a report by Mr. R. Keith Jopson, British Vice-Consul at Montevideo, on economic conditions in Uruguay (Stationery Office, 1s. 6d. net). The preface to this report gives the population of the country as 1,850,000, over a third being in Montevideo, the capital. In 1929 the exports, of which Great Britain took 23.1 per cent., had a value of about £15,460,000, while imports (Great Britain 16.0 per cent.) amounted to about £15,800,000. It is estimated that British capital to the total of £41,000,000 is invested in the Republic, chiefly in public utilities, cattle raising and the meat industry. Uruguay is favourably inclined to British goods but price competition is very keen. It is not possible to ascertain from official Uruguayan statistics what the British share in the electrical trade is, but the British figures show it to be small in value. It may be said, however, that this country's exports of electrical goods and apparatus to Uruguay rose from £17,642 in 1928 to £52,968 in 1929; traction motors valued at £6,840 (against £2,173) were also supplied. As the market is so small it is considered that in most cases the best method of conducting business is through an agent on a commission basis. For machinery 90 to 180 days' credit is usually allowed; for certain special plant American manufacturers have allowed up to 18 months.

Among the contracts awarded by the Government in 1929 was one for the construction and equipment of a power station for Montevideo. The Metropolitan-Vickers Electrical Co. secured the sub-contract for the electrical plant valued at $3,000,000 (about £500,000). Tenders were received for an automatic telephone system for the capital from the Cable, Telephone & General Trust, Ltd., the International Telephone and Telegraph Corporation, the Swedish Ericsson Co., and Siemens & Halske. No decision had been arrived at up to the date of the report. Five foreign firms and a British company were invited to submit plans for the construction of a hydro-electric power plant on the Rio Negro, but, says the report, the British company declined the invitation.

Among other matters dealt with is the subject of tariffs. Mr. Jopson states that a 50 per cent. general increase of import duties has been proposed to rectify the adverse trade balance but it has aroused considerable opposition.

The State Electric Light & Power Co., which has a monopoly of electricity supply in Uruguay, made a profit of $3,000,000 in 1929 and as a consequence the administration is considering the desirability of reducing the rates charged to consumers in the interior.

Radio Manufacturers' Association.

Annual Dinner and Meeting.

THERE was an excellent attendance at the annual banquet of the Radio Manufacturers' Association, which was held on December 3rd at the Savoy Hotel, London, some four hundred members and guests being present. Sir William Bull, president of the Association, took the chair.

Following the loyal toast, Mr. William Adamson, M.P., Secretary of State for Scotland, rose to propose the toast of "The Association." Mr. Adamson gave some interesting figures regarding the growth of the radio industry in this country, and said that there were now 3,250,000 licences issued, which represented a listening public of 13,000,000. By this time next year, he said, there was reason to believe that the number of licences would have reached 4,000,000. From the amount obtained from licence fees the Treasury benefited to the extent of £300,000 and that was devoted to State affairs. The Association represented a capital of £80,000,000 of which every penny was British. Ten years after its inception England to-day had a broadcasting system which was the envy of the world. The secret of the success of the B.B.C., Mr. Adamson added, was that the radio manufacturers had kept just one pace ahead of it and had been prepared for any developments. If it had not been for the manufacturers ten years ago there would be no B.B.C. to-day. The nation owed the radio manufacturers a great debt both for initiating and perfecting the broadcasting system.

Responding to the toast, Captain J. W. Barber, chairman of the Association, said that underlying radio was something far greater than its commercial and entertainment features. Radio had already been the means of assisting the Government, and it must be looked upon as one of the nation's vital forces in the case of a national crisis.

The toast of "Our Guests" was wittily proposed by Mr. R. Milward Ellis, vice-chairman of the Association, and responded to by Sir Stafford Cripps, K.C. Mr. S. R. Mullard proposed the toast of "The Press," which was acknowledged by Mr. Hannen Swaffer. The toast of "The Ladies" was given by Mr. A. Beverley Baxter, and Miss Madeleine Carroll responded.

The dinner was succeeded by a dance and a cabaret performance.

Annual Meeting and Luncheon.

The annual meeting was held on the following day (December 4th) at the Savoy Hotel, Sir William Bull again occupying the chair. After the conclusion of the formal business, which included the adoption of the annual report and financial statement, followed the election of officers for the ensuing year. Sir William Bull was unanimously re-elected president, and there were no new nominations for vice-presidents. Before the ballot of members of the Executive Council was taken, Sir William Bull suggested that it might be advisable to restrict the number to be elected to 18 so as to permit additions to the membership during the year if necessary. The result of the ballot was announced during the subsequent luncheon. The report mentions the loss sustained by the Association by the deaths of Lord Birkenhead, one of the first vice-presidents, and Mr. R. B. Weaver, one of the most active members of the Executive Council. With regard to the problem of price-cutting, the report states that the Council came to the conclusion that the first steps should be directed towards preventing, so far as is possible, the cutting of retail list prices, and that this could only be brought about effectively by the operation of a "stop list." Members of the Association were therefore invited to register their retail list prices for protection by the Association, and at the beginning of July practically 75 per cent. of the members had responded to this appeal. The consideration by the Council of the question of price maintenance was complicated by the appointment by the Government early in the year of a committee to consider practices which result in withholding from retail traders goods in which they wish to deal or which prevent the re-sale of such supplies except on conditions imposed by the suppliers. A memorandum dealing with the Association's attitude towards price-maintenance practices was sent to this committee. The regulations governing the participation of members in exhibitions have been slightly modified, as it is realised that participation in a large number of small exhibitions is costly to the manufacturers and of little benefit to the industry, while the presence of one member at an exhibition leads inevitably, by reason of competition, to the presence of others also. Mention is made of the success of the last National Radio Exhibition both financially and from the point of view of the exhibitors; it is understood that this is the only exhibition held this year at Olympia which has not had a reduced attendance to report. A matter of great importance which has been occupying the attention of the Council during the past few months is the question of co-operative publicity. The possibility of instituting a general radio publicity scheme has been investigated and various proposals as to the method of effecting it are under consideration. In conjunction with the B.B.C., the Trade Press, the B.R.V.M.A., the R.W.F., and the W.R.A., the Association co-operated in the organisation of Radio Week in January last. The Association is in correspondence with the Electricity Commissioners regarding the matter of the replacement of radio apparatus by electricity supply authorities changing over from d.c. to a.c., and it is hoped that a satisfactory settlement will be attained in the near future. The Association has co-operated with the I.E.E. in the revision of the Institution regulations for radio apparatus connected to electricity supply mains, and advice was given to the British Engineering Standards Association with regard to the proposed standardisation of five-pin valve bases. Recommendations were put forward by the Association to the B.E.S.A. and Primary Battery Makers' Conference with regard to the standardisation of h.t. batteries and a standard test method of test has been evolved. A gift of a thousand complete one-valve sets was made by the Association and its members to the British "Wireless for the Blind" fund and a donation of 100 guineas was made to the British Electrical and Allied Industries Research Association. Ever since its inception four years ago it has been the policy of the R.M.A. to co-operate with the B.B.C. to the fullest possible extent in matters touching the interests of the trade, and this policy resulted in the Association receiving advance confidential information regarding the technical details and date of the opening of the Northern Regional station.

A recommendation of the Council relating to the importation of foreign-made radio apparatus caused much discussion at the general meeting. It was proposed by Captain Barber and seconded by Mr. L. McMichael that a clause should be included in the "Constitution" of the Association to the effect that radio goods should be considered of foreign manufacture, if they incorporated any component part or parts manufactured outside the United Kingdom, the purchase price of which component part or parts exceeded 5 per cent. of the published retail list price in the United Kingdom of the marketed apparatus. Captain Barber explained that 5 per cent. of the retail price might quite conceivably represent 20 per cent. of the purchasing costs. Replying to a suggestion that in the case of small components such as valve holders, 5 per cent. was not sufficient, Captain Barber said that the R.M.A. was not worried about small components; it was aiming against the large imports. Mr. W. H. Lynas, of Burndept Wireless (1928), Ltd., said that 5 per cent. was not sufficient and added that 10 per cent. would be more satisfactory. Mr. Milward Ellis, of Climax Radio, suggested a compromise at 7½ per cent., while Mr. Rosen said that even 5 per cent. would throw many manufacturers out of business. A system of grading was also put forward. Capt. Barber objected to raising the figure to above 5 per cent. in view of the fact that the Association would possibly be making application shortly for a marking Order for radio apparatus, and that the Government would certainly not consent if the Association was unable to show that it was making some effort to protect its members. After further discussion the president suggested that the original proposal should be given a trial and this was agreed to by the meeting. It was also decided that the new clause should come into operation on September 1st next, just before the Radio Exhibition.

Under the heading "other business," Mr. H. Joseph requested that cabinets should be included in the R.M.A. schedule of radio apparatus. There followed a discussion on the advisability of this step with reference to the motion just carried regarding foreign apparatus, and it was at length decided that the matter should be left in the hands of the Council.

At the luncheon which followed brief speeches were made by Sir William Bull and Captain Barber, and the election of the following to the Executive Council was announced:—Brownie Wireless Co., of Great Britain, Ltd.; Burndept Wireless (1928), Ltd.; Chloride Electrical Storage Co., Ltd.; Climax Radio Electric, Ltd.; Columbia Graphophone Co., Ltd., Dubilier Condenser Co. (1925), Ltd.; Edison Swan Electric Co., Ltd.; Ferranti, Ltd.; General Electric Co., Ltd.; Graham Amplion, Ltd.; Igranic Electric Co., Ltd.; Kolster Brandes, Ltd.; L. McMichael, Ltd.; Marconiphone Co., Ltd.; Mullard Radio Valve Co., Ltd.; Pye Radio, Ltd.; Radio Instruments, Ltd.; and Standard Telephones & Cables, Ltd.

A Continuous-heating Installation.

A 60-kW electrode circulator connected to an existing coke-fired system, with unusual arrangements for high- and low-rate metering.

A VERY interesting heating installation, and one which, on account of its simplicity, will appeal to a large field of consumers, has just been completed in the new meter warehouse and meter-testing rooms and workshop of Messrs. Robert Hornby, Ltd. The problem to be solved was to keep in store a very large number of electricity meters, ready for immediate delivery, at a reasonably steady temperature during the winter, and to keep the meter-testing room and workshop at a steady temperature of 60 deg. F., day and night. The building was previously heated by a hot-water circulating system fed from a coke-fired boiler, which boiler gave every satisfaction, except that it went out during the night and week-ends, resulting in the building becoming cold, with the probability of the radiator system freezing up in severe weather; in fact this actually happened.

The first step was to put in a Bastian electrode circulator, which can be seen in fig. 3 standing beside the coke boiler. The circulator is joined up simply to the flow and return pipes of the system, with valves for shutting off for cleaning, should this be necessary. The maximum loading of the circulator is 60 kW at 400 volts, 3-phase, but by turning the hand wheel at the top the loading can be reduced by easy stages to about 4 kW. A room thermostat coupled in series with a safety water thermostat controls the circulator through a contactor; a simple diagram of the control circuit and general arrangement is shown in fig. 1. In order to maintain the constant temperature in the test room and workshop day and night an increased radiation area has been provided in these rooms, to which, by means of magnetic valves, an extra supply of heat is automatically conveyed during the night hours when the temperature of the building tends to fall. In the remaining rooms of the building the temperature will at times be less than 60 deg. F., but sufficient heat will be conveyed to them to prevent freezing of the radiators in severe weather.

The electricity is supplied at the following charges: day load (8 a.m. to 8 p.m.) £4 per kVA, plus ¾d. per kWh; night and Sunday loads, ½d. per kWh. In view of this somewhat complicated tariff, the metering of the electricity supply presents some interesting features, and by arrangement with the Metropolitan Electric Supply Co., Ltd., the meter equipment is provided by Messrs. Robert Hornby and Co., Ltd., themselves. It consists of a three-phase, two-rate meter and a maximum-demand indicator combined in one case, and a separate electrically-wound time switch. The maximum-demand indicator is actuated by the meter and is reset at 30-minute intervals by the time switch, which also brings the high-rate and low-rate dials of the meter into operation alternately at the appropriate times, and disconnects the maximum-demand indicator during the night and Sunday, in addition to controlling the main supply. The diagram of connections is shown in fig. 2.

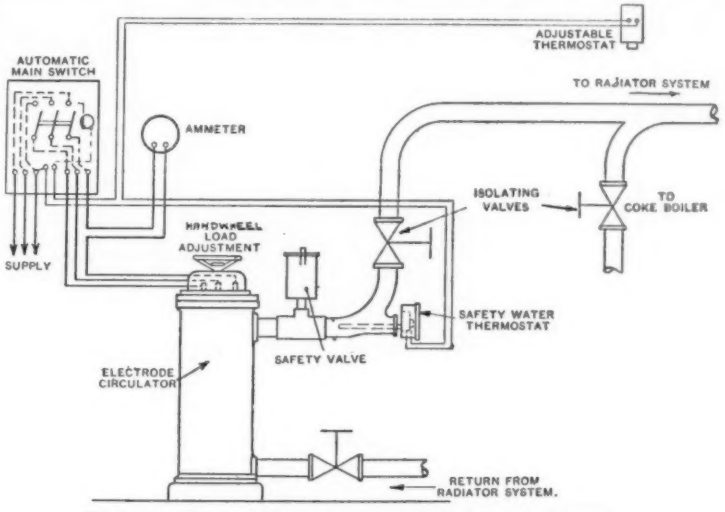


Fig. 1.—General Arrangement and Control Diagram.

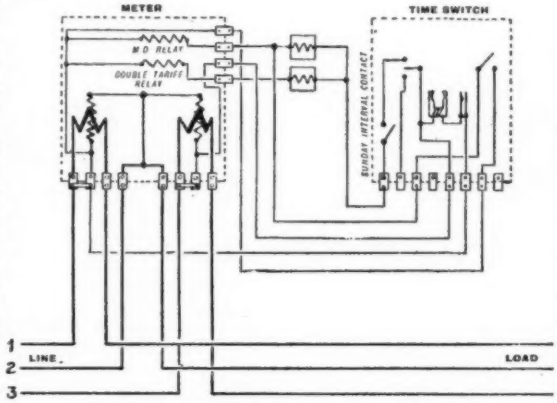


Fig. 2.—The Metering Connections.

The main control apparatus consists of a triple-pole contactor switch made by the Watford Electric and Manufacturing Co., Ltd., a triple-pole main switch with three single-pole "Z" type fuses rated at 125 A, and an ammeter, all metal-clad and mounted on a sheet-iron panel.

Given suitable tariffs there would no doubt be a large field for such applications as this, as the comparatively small capital cost combined with low night charges would appeal to those in charge of large warehouses with goods which suffer from changes in temperature, or to those who have difficulty in keeping up their coal fires at night, such as in hospitals or hotels. The apparatus is very robust and takes very little room, and it would be applicable to almost any coal-fired installation.

An outstanding feature of the installation described in the foregoing notes is the possibilities it suggests for the extension of electricity supply. In all towns of any size there are probably many coke-fired heating installations of about the size of the one in question, and, so far, they have put up an almost impenetrable barrier on the score of capital cost to the approach of the supply engineer. The ease with which an electric circulator can be adapted to an existing system, coupled with the low capital cost and probable saving in space, should do much to overcome this difficulty.

The electrode-circulator equipment was supplied by the Bastian Meter Co., Ltd.

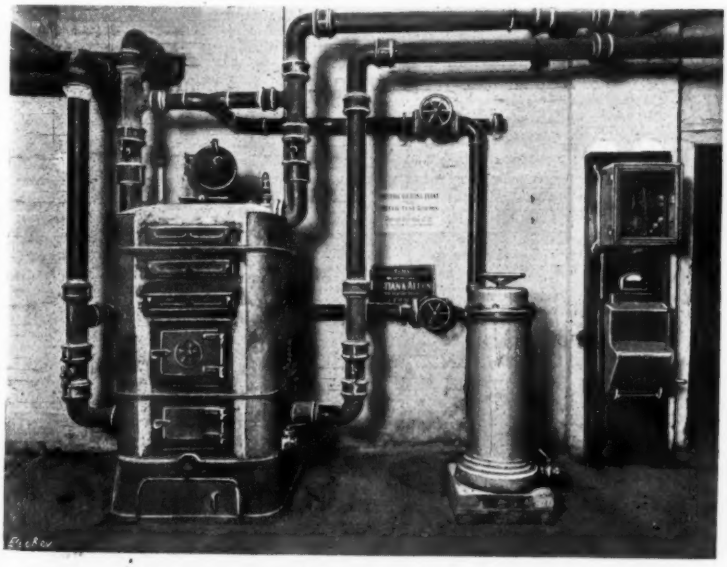


Fig. 3.—Electrode Circulator Connected to Coke-fire System.

Modern Electric Lighting.

Some comments on recent tendencies in the design of fittings, users' requirements, and the correct application of artificial illumination.

AT a meeting held in London under the auspices of the Design and Industries Association, over which Mr. H. T. Young presided, a discussion on the above-named subject was opened by Mr. R. D. Best and Mr. R. McGrath (the latter was the winner of the competition last year in conection with the Palace of Light at the Ideal Home Exhibition).

Fittings.

Mr. R. D. Best limited his remarks to fittings and portable standards, and exhibited photographs of many English and foreign examples. He confessed to a vague dissatisfaction with the name "lighting fittings," believing quite seriously that the status of the trade, and probably the standard of general design, could be raised if a good alternative name for those wares could be found. In Germany the new word "Lichttrager" (light carrier) had been used since the war. Alternative names had been used in America, but none of them complied with his idea of what the word should be. There was a great opportunity for someone to help an important industry.

In the type of fitting which totally enclosed the lamp the distribution of light followed the surface of the glass, so that a squat drum-shaped diffuser, by presenting a proportionately large horizontal surface, tended to concentrate the light on the horizontal surfaces below and above. When several of them were used, they should be spaced rather more closely together than when fittings of tubular form were used. The long tubular form tended to disperse the light and illuminate the walls and vertical surfaces. In a globular form the distribution of light would theoretically be uniform in all directions. Indirect lighting reflected from the ceiling was inclined to be rather flat and depressing, but this objection was overcome by the use of a translucent bowl. In its day, the English alabaster bowl pendant of simple and good shape was extremely satisfying, but even that, by eliminating shadows, tended to produce an uninteresting effect. Another disadvantage of indirect lighting was that the opaque bowl formed a harsh, black silhouette against a well-lighted ceiling. That had been avoided in the "Duplexalite" unit, constructed of metal tiers arranged in such a way that some of the light from the single lamps was used to illuminate the outside of the unit itself, giving it a live appearance that was enhanced by the introduction of spots of colour inside the units, which were reflected on the exterior. A practical form of reflector which had recently become very popular in Europe consisted of three inverted opal-glass dishes. The aim was to produce even distribution of direct lighting, without the intervention of any glass between the lamp and the surface beneath. At the same time, the eye was shielded from the filament, unless almost directly below it, when such precaution was obviously not necessary. The fitting looked clean and serviceable.

Modernity.

The trick of using converging triangular planes in lighting pendants had become almost tiresome, but that was not the worst; unfortunately, many manufacturers in this country, believing that their products had only to conform outwardly to modernity in order to be well designed, had turned out by mass production wares which would probably sicken the public of a tendency that was originally healthy. It was difficult to draw anything as ugly as much that was being sold as modern. Instead of straining after modernity, the manufacturer and designer should be striving by practical experiment to produce something which was decent and fit to live with, using whatever idiom happened to be called for as their raw material. He disapproved of all ready-made theoretical dogma and of the sort of critic who looked with disapproval at a plane or line because it was curved. It was sometimes said that the practice of using a central body and arms to support lamps was a survival of the gas and candle age, and, as such, was likely to be eliminated, as the carriage lines of the earily motor-cars had been. That he believed to be a risky doctrine, and he showed examples of fittings which he regarded as well designed and pleasant, although constructed on those so-called archaic lines.

Mr. Best drew attention to the care which had been devoted to ensuring easy access to interiors for the purpose of changing lamps. Some very attractive fittings were shown in which internally-frosted glass tubes were used. The application of tubular lamps, which were becoming increasingly popular in this country, had great possibilities, and he drew attention to the recently-introduced tubular lamp that could be used with an ordinary bayonet-catch lampholder and did not necessitate wiring at both ends. Some ingenious applications of tubular, or strip, lamps to ceiling fittings were illustrated. In a Berlin restaurant transparent glass tubes were arranged in a sort of trough of semi-circular cross-section; above, on the ceiling, was a flat mirror, and in the middle of the trough there was a single row of strip, or soffit lamps, the mirror imparting the effect that the glass tubes were all lighted from within.

Concerning tendencies in Germany, once perhaps the most tasteless nation in Europe, by sheer hard work and practical trial and error their designers had achieved a level of performance which was outstanding. The significant thing was that it was team performance, not isolated and sporadic bursts of creative endeavour unrelated to anything else, but a sound organic movement. The same thing, in a lesser degree, could be said of contemporary French design and, judging from last year's Seville Exhibition, of Spanish also. In each case, although influences were coming in from outside, the growth was healthy and natural because it had its roots in things which were national. In Britain, although excellent work was being done in the electrical industry, they were all suffering from a sentiment of inferiority, which was preventing them from continuing in a freer style from the start already given to them by other nations. There was so much excellent material if they would only use it; from a purely commercial point of view, too much copying of foreign ideas should be stopped. They lived partly by their export trade, and customers abroad turned up their noses at things too obviously inspired by French and German ideas.

Quantity and Quality.

Mr. R. McGrath, discussing quantity and quality of architectural illumination, emphasised the prominent part which artificial illumination was playing in their daily lives and in all forms of modern art. Sight was naturally the chief factor in man's intellectual development, but it must be remembered that it had been almost entirely evolved under conditions of natural daylight. It was only to be expected, therefore, that the eye was not readily prepared to adapt itself to modern conditions of artificial lighting. The result was fatigue, both mental and physical, and it was with the elimination of fatigue and the provision of surroundings restful, or invigorating, in their lighting arrangements that they were all concerned.

He urged the necessity of realising that, even with indirect, semi-indirect, and all the other methods of lighting at their disposal, the whole character and beauty of a room might be made or marred by the simple operation of a switch. They must bear in mind both the quantity and the quality of illumination. Experiments relative to fatigue showed that in diffused daylight the eye's efficiency was 95 per cent.; in indirect artificial light it might be 90 per cent.; in semi-indirect light, 25 per cent.; and in direct light only about 15 per cent. Text-books laid down many standards of efficient lighting, but, even so, over-lighting, under-lighting, and many irritating varieties of concentration were still to be met with commonly. The fault lay as much with the architects as with anybody. Installations of indirect lighting often exhibited fitful points of diffusion, or the light was so uniform that it was fatiguing; monotonous and excessive lighting blunted appreciation. In good lighting it was generally necessary to eliminate harsh shadows, but diffused light was not in itself good; it might produce merely shapelessness. Directional light was brought to the surface of diffused light, and they aimed at combining them in such a way as to produce shadows of just the right quality. For artistic interior effects variety and mobility of light were essential, a formal balance between light and shade. A room lighted continuously from a fixed source by one quality of illumination might very easily become commonplace. One was refreshed by variations of intensity and by qualitative differences in colour; the fascination of natural light consisted in its constant and rythmical changes, wherein lay its benefits to living organisms.

Coloured Light.

Colour was beginning to play a greater and greater part in illumination, which factor was closely bound up with light intensity; certain colours constituted shadows in themselves. The eye was most sensitive to yellow; red was the most fatiguing colour; green and blue-grey, the colours which prevailed in nature, fatigued least of all; finally, the greatest speed and power of clear sight was by the light colours of the middle of the spectrum, blue, green, and yellow. The application of such facts to interior architecture was most important. Pink, orange, yellow, green, and blue, which ensured the highest degree of luminosity, would be the colours most likely to be given consideration where lighting depended

on reflecting surfaces. In general, particularly in domestic work, light-tinted monotone walls and ceilings, free from coloured designs, afforded the best reflecting and diffusing surfaces. Again, harmonious and spacious effects were more readily obtained when the ceiling was the same colour as the walls, though it should be preferably some shades paler. If the lighting fixtures or features were chosen for the kind of light they gave rather than for individual decorative appeal, the general scheme was likely to be most successful. The practice of building a room and then filling it with light fittings was a relic of the days when illumination was a matter of impermanent candle sticks and torches; the lighting equipment should be part of the structure of the room itself.

One of the illustrations shown to emphasise the value of designing the lighting as a part of the architectural scheme was the interior of a house in which all the light sources were below the floor level; all the light was reflected from the ceiling, and the doors were designed to catch the light as it travelled upwards.

Different circumstances needed different treatment. Some factory operations, for example, precluded the slightest amount of directional light, with its resulting shadows; in such cases shape was distinguished by means of colour. In a foundry, on the other hand, where everything was uniformly black, shadows were essential in order to be able to distinguish the forms of things.

Finally, Mr. McGrath pointed to the refreshing and reposeful value of light passing through water. Beautiful results could be obtained by the illumination of swimming pools from below, particularly when several flood-lights were directed also from above to give a sparkle to the surface of the water, as was done in the swimming pool at the Lido in Paris.

Discussion.

In the subsequent discussion some speakers urged that too much attention was often attached to exotic fittings, with the result that they absorbed all the interest of people entering the rooms. Some urged the elimination of fittings altogether as being extraneous from the point of view of the decoration of a room. On the one hand, it was pointed out that the fundamental novelty of electric lighting was that the light sources could be hidden away in entirely enclosed spaces, so that all that could be seen was a luminous surface. On the other hand, it was explained that there were houses existing to-day which would exist for another century or more, and on which it would be necessary to spend hundreds of pounds on alterations in order to achieve the ideal in lighting. Therefore, fittings were necessary, and it was for designers to ensure that they were suitable and efficient for their purposes.

Some criticism was directed to the tendency in many cases to follow too slavishly the trend towards natural lighting effects. Some speakers favoured the practice of lighting a room from sources near the windows, so that the artificial light would come from the same direction as the natural light obtained during the daytime, whereas others contended that in those parts of the world where daylight was almost perpetual it became monotonous, and put that fact forward as an argument for distinctively differentiating between natural and artificial lighting.

Private Power Plant.

A plea for the economic advantages of private and industrial steam-operated heat- and power-generating plant in preference to the purchase of electricity from a public undertaking.

(*Extracts from a paper read before the* INSTITUTION OF HEATING AND VENTILATING ENGINEERS, *London.*)

ONE of the most unsatisfactory aspects of the public supply of electricity was the extraordinary diversity of the tariffs employed, remarked Mr. E. G. Phillips, M.I.E.E., M.I.Mech.E., when discussing the above subject recently. Commenting on the remarkable ingenuity of many of the "designers" of such tariffs, he contended that supply authorities' engineers were usually too scientific to be commercial.

It was quite easy to understand the basis of such complicated tariffs; technically they were correct and could be justified, especially from the supply authorities' aspect, but was it not undesirable and very uncommercial for either the supplier or the customer to be unable to estimate the cost of the commodity offered? Would it not be considered at least curious if a butcher, when asked his price for mutton, included in his explanation reference to the day of the week, the hour of purchase, the proportions of bone and fat, the credit value of the wool removed from the carcase, the cost of hay, or the rent of grass land; while the greatest difference in the cost would be due to whether the meat was to be eaten for the mid-day meal or kept for a late meal after one returned from the theatre. The author pleaded strongly for supply authorities to "commercialise" their present "scientific" tariffs, or at least make an honest endeavour to educate the prospective consumer by giving one or two practical examples in their literature, somewhat on similar lines to those adopted by the gas companies, although their system of charging was less complicated.

The economies in coal consumption anticipated by the Electricity Commissioners had eventuated, the average weight of fuel used per kWh generated in the new large super-stations being now in the neighbourhood of 1.25 lb. Unfortunately power stations utilised only the kinetic energy of steam and had to reject almost the whole of its latent heat; all the while those conditions continued, so long would the thermal efficiency of steam-driven power plant remain below 25 per cent.

Stations had reached their ultimate limits of capacity due entirely to the inability of canal or river to handle the amount of heat that was rejected, whilst actually around those stations were ready means of disposing of heat to customers who were now burning fuel for heating purposes and for hot-water services, to say nothing of the vast amount of steam usually generated in close proximity to power stations for industrial processes.

The published figures of some of the 235 municipal undertakings were quoted to show how difficult it was to ascertain a reliable and accurate figure for comparison purposes, and to imply how the purchaser of electricity from the outside authority was at the mercy of the policy, and even the politics, of the municipal body controlling the station. The author contended that a public supply was not ideal, and that the industrial consumer's account was always liable to fluctuate, due to various covering clauses usually incorporated in a long-term agreement, while beyond all doubt the average cost throughout the country was in excess of that at which energy could be produced in any industry in which steam had to be raised for manufacturing purposes.

The possibility of industry ever being able to purchase the "waste" heat of power plant was extremely remote, and presumably for many years to come the amount of fuel now used for the purpose of steam raising for works' processes would not be seriously reduced. It was recognised that the average efficiency of industrial boiler plant was low, about 65 per cent., and that it could be raised by, say, 15 per cent., but the economy that such reorganisation of steam-raising plant would effect was nothing to be compared with the reduction in coal consumed that could be effected by a combination of both the reduction of power and also heat in one and same plant. On those lines the author suggested that greater economies could be obtained than had ever been effected by any other development in steam engineering. He urged greater co-operation between those who formulate the policy of generating and consumers. At present if the management of an industrial concern requiring considerable quantities of steam for its manufacturing process considered the installation of generating plant to work at the high efficiency which such conditions permitted, it would usually be informed by the public electricity supply authority that it was not prepared to remain as a stand-by, or a convenience, unless it was paid a very considerable minimum sum p.a., which in many cases amounted to a large proportion of the value of the economy to be effected. Surely it should be possible to deliver any surplus electricity into the supply companies' mains and at a cost to them much less than they themselves could produce, while every encouragement should be given to the consumer so that he need only install the cheapest and simplest pure back-pressure sets and take every kWh that could not be produced under those conditions from the supply authority.

The present policy was to refuse to give a supply to a consumer having his own plant unless a stand-by charge was paid, but a dye house or a laundry, paper mill or a brewery, hotel or an institution, all must install steam-generating plant and, even if electrical energy were available free of all cost, those boiler-house charges would still be incurred. In a case in which two 250-kW a.c. reciprocating sets were installed, with an elaborate switchboard, the capital expenditure in-

volved amounted to £4,000, excluding buildings, the plant being fixed in an existing room. The energy generated per annum = 700,000 kWh; cost per kWh generated = 0.25d. per kWh; annual saving, compared with the purchase of 700,000 kWh at 1.95d., = £5,700. Details of many installations would be tedious, but a typical case was interesting. A Poor Law institution had had its own generating plant for 30 years, consisting of steam-driven sets exhausting direct into the heating and hot-water services, for the laundry, kitchens, &c. Rather than spend money on modernising the equipment, it was decided to scrap it in its entirety and take a supply of electricity from a selected station almost overshadowing the institution. The result was that the latter had to spend £2,300 on transformers, rectifiers, &c.; some £1,500 on cables (less a contribution from the supply authority); and, when completed, the coal bill would remain exactly as before, whilst the cost of purchased electricity would not be less than £1,500 per annum. The net result was that a sum of from £3,000 to £4,000 had been spent to increase the annual cost by £1,500 p.a.

In conclusion, Mr. Phillips said that the thermal efficiency of steam-driven stations would not exceed 25 per cent. unless a market was found for their heat as well as energy output. The possibility of a "cheap and abundant supply" was still remote, for grid capital charges, maintenance charges on the distribution system, the loss in transmission, &c., would appear likely to absorb the whole of the economies effected in the coal bill, and still add additional charges; in short, "your current will cost you more," not less.

The extension of standardisation to low-voltage distribution systems was highly desirable and, above all, a commercial and standard tariff understandable by the man in the street was essential. It should be possible for a supply undertaking to ascertain the working conditions, visualise the type of load, and quote a flat rate to meet those conditions without detriment to either side. Such methods would inspire confidence in prospective consumers, and would ensure a correct and satisfactory decision being taken in almost every case. Full recognition of the strength of the combined steam and power system should be made, both from the individual and national viewpoints, and the utmost should be made of the back-pressure system, resulting as it did in reduced manufacturing costs, the conservation of coal, and the reduction of the smoke nuisance and its accompanying fogs.

New Electrical Devices, Fittings, and Plant.

Readers are invited to submit particulars of new or improved devices and apparatus for publication in this section.

A New System of Lighting Fittings.

The word "Hedralite" has been evolved as being descriptive of an ingenious system of many-sided (polyhedron) lighting fittings now being developed by Messrs. HOLOPHANE, LTD., Elverton Street, Vincent Square, S.W.1. The system of construction is the invention of Mr. Ernest Stroud, chief engineer of the company, and the principle involved is the adoption of a series of geometrically-shaped prismatic glass panels, by means of which lighting fittings of various designs and sizes may be built up. The system employs a definite series of glass panels consisting of two squares of different sizes, a rectangle having its long sides the same length as the larger square and its short sides the length of the smaller square, a right-angled triangle with its hypotenuse the length of the larger square and its short sides the length of the smaller square, and an equilateral triangle with its sides the same length as the smaller square. The system is not limited to five panels only, but five form a series; further series will be made as the scheme develops, so that it will be possible to form panelled fittings of still larger or smaller magnitude, all of a definite geometrical relation to form fittings suitable to build a ceiling laylight, or a small lighting unit for the home. The glass panels as at present made are designed with a series of prisms on the interior surface to split up the light rays, and on the exterior surface a combination of concave flutings, giving a soft diffusion and spreading to the natural light distribution of the bare lamp. The construction of designs from these five figures will cover hundreds of different shapes to suit practically any style of architecture or any form of modernist lighting. With the larger forms of pendant fittings, and in the construction of ceiling panel types, a special patented method of fitting construction is used. This employs standard die-cast metal corners of the particular shape to form the design of fitting required, and also special metal connecting straps, so that it is possible actually to build up large lighting fittings from finished parts. With the smaller series of fittings the die-cast metal corner construction is not practicable, so that the metal framework is built up in a light skeleton form. With this novel system fittings may be constructed of dimensions suitable for large buildings or of small sizes to suit the home. The accompanying illustrations, figs. 2 to 7, show a few simple forms of construction.

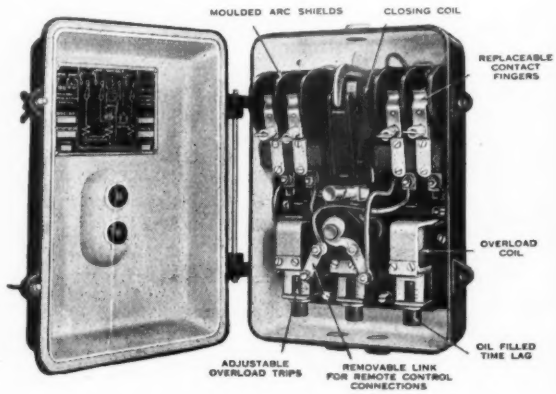
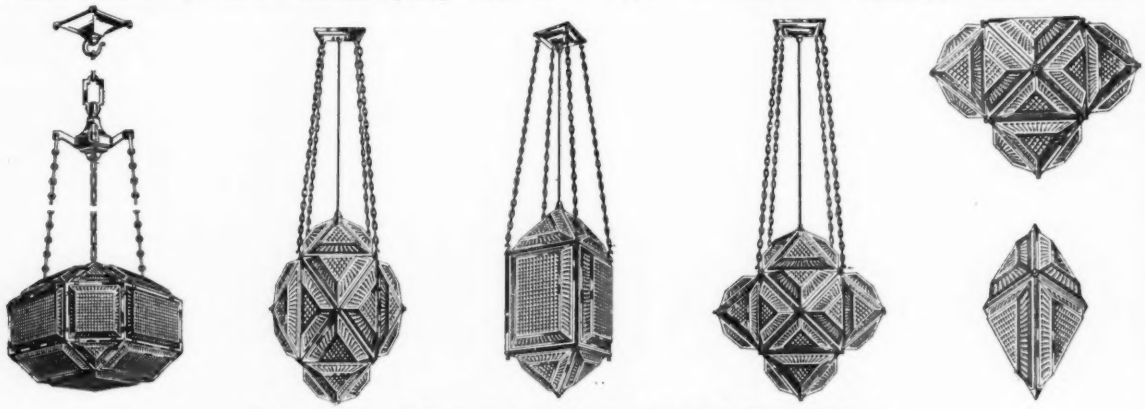


Fig. 1.—"Magnet" Direct-type Contact Starter.



Figs. 2 to 7.—Selections from Range of "Hedralite" Fittings.

Direct-type Contactor Starters.

A new range of direct-type contactor starters has just been produced by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2, for starting 2- or 3-phase squirrel-cage motors by connecting them direct to line by the simple operation of a push button. The starters are available for motors of ½, 1, 2, 3, 5, 7½ and 10 h.p., up to 500 volts, each size being

fitted with suitable no-volt and magnetic overload time-lag releases. The complete unit, fig. 1, comprises a 4-pole contactor, together with the relays mentioned, mounted on a bakelite panel, the whole being enclosed in a black-enamelled case fitted with a hinged cover. The two push buttons for starting and stopping the motor are built into the cover, and two holes are drilled in the case for incoming and outgoing cables. A third entrance is provided so that push-button control from one or more remote points can be employed, while an ammeter can be fitted on the top of the case if required. The contacts are designed in accordance with full-size contactor practice, and are separated by arc-resisting barriers. Overload protection is applied to all three phases, so that, in the event of a fault, the motor cannot continue to operate on a single phase. These relays are self resetting, and have inverse-time features, affording protection against short-circuits and saving delay due to blown fuses. Contractors and installation engineers will appreciate the many advantages of these starters, more especially their small size and weight, the low installation and maintenance costs, and the fact that all wiring is carried out on the front of the panel.

A Simple Mechanical Wedge.

The accompanying illustration, fig. 8, depicts a simple mechanical wedge which has been introduced by MR. J. T. TOWLSON, 9, Saville Road, Silvertown, N.16, for setting heavy work on machine planes. It is shown wedge-raising from the planer table a twenty-ton job—just by pulling on a ¾-in. by 12-in. spanner. Three mechanical forces are introduced in the device, the lever (twice), the wedge, and the screw, and the whole combination provides a lifting ratio of 69.120 to 1. Having raised the bottom surface of the job off the planer table, to get it higher than the wedge effects is quite easy, by just packing up and laying additional thicknesses of sheet steel on the top face of the wedge. The operator will be aware that it is logically necessary to block the job up, so that the wedge, on meeting the casting, does not push the latter away. It is expected that such a device, made in cast-steel, with

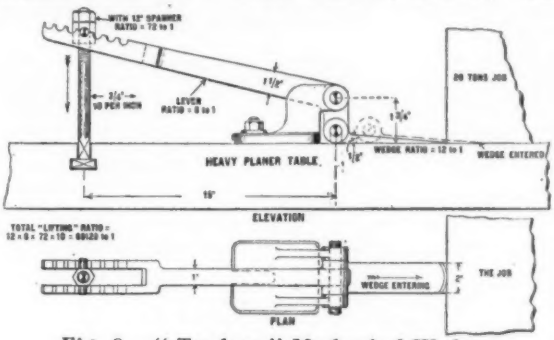


Fig. 8.—" Towlson " Mechanical Wedge.

mild-steel pivot pins, and the wedge of high-quality steel, will pay more than cent. per cent. on heavy planer jobs.

A Novel Christmas Gift.

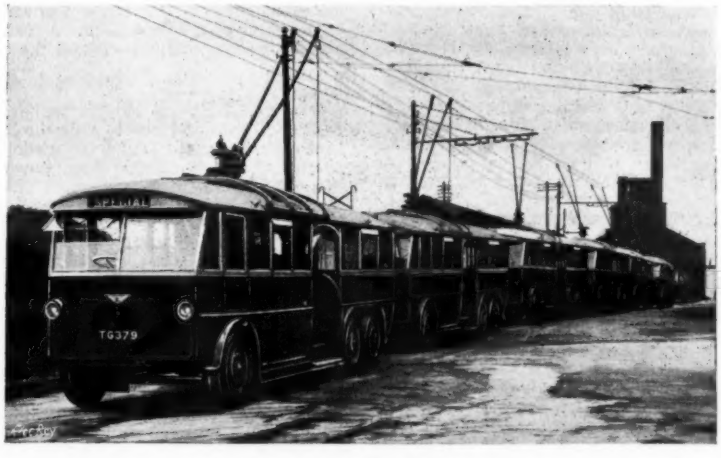
We are interested to learn that VENNER TIME SWITCHES, LTD., 45, Horseferry Road, Westminster, S.W.1, are making a special feature this year of their " B.H." time switch for controlling ordinary domestic hall lighting. This is put forward as a very useful present, inasmuch as it takes the form of a burglar scare. It is fitted in an oak box with a glass front.

New Trolley 'Buses.

A fleet of seven vehicles has been put into service by the Pontypridd Urban District Council to replace the old tramway system.

AS the result of a decision by the Pontypridd Urban District Council, in collaboration with its engineer, Mr. J. E. Teasdel, M.I.E.E., to substitute a more modern system of transport for the old tramway, seven single-deck electric trolley-'buses were ordered from the English Electric Co., Ltd., and were put into service in September last.

Each 'bus is of the six-wheel type, has seating accommodation for 32 passengers, and has an overall length of 27 ft. 6 in. and a wheelbase of 17 ft. The 'bus body is of the latest design and is fitted with a centre entrance. The chassis has pressed-steel side frames braced with suitable transomes, and is provided at intervals with outrigger brackets for supporting the body The drive, which is designed to eliminate wheel slip and to reduce to a minimum the strain on the driving gear, is transmitted to the two rear axles through a cardan shaft and three differentials, so as to give a differential drive between the two wheels of each axle and between the two axles themselves. A double swivelling point is provided for the rear bogie, in order to correct any tendency to tilt when braking. This construction also equalises the adhesion of the wheels, with the result that the braking is rendered more efficient. It also considerably relieves the springs of undue stresses.



New Pontypridd Trolley 'Buses.

The steering gear is of the cam-operated type, the cam actuating a hardened pressed-steel roller mounted between two ball bearings. Two separate brakes are provided, for hand and foot operation, respectively, and they control three different braking systems. The hand brake consists of an ordinary lever which applies the brakes to the four rear wheels. The foot pedal serves two functions; its initial depression applies electric rheostatic braking through two brake positions, and further depression, whilst retaining rheostatic braking, applies air brakes on all six wheels, the air brakes applying different shoes to the rear wheels to those applied by the hand brake.

The electrical equipment is the latest design of the English Electric Company for use on trolley-'buses. The motor is a 60-h.p., self-ventilated, interpole machine for operation on 500 volts, and its essential control equipment comprises a master switch, a reverser, contactor and current-limit panels, and a brake switch. The master switch is of the drum type of robust design, and it controls the operation of the contactors and ensures that they open and close in correct sequence. It is operated by a pedal and lever, so proportioned that the effort required is quite small and compares favourably with that necessary for the accelerator of a petrol vehicle The contactors are built up of interchangeable parts and have substantial adjustable contact fingers provided with renewable tips, thereby rendering maintenance a very simple matter. Auxiliary contacts are also fitted, but as the current carried by the contactors is quite small, the arc set up when breaking circuit is negligible. The bank of contactors is mounted in a compact steel case lined with asbestos and fitted with a removable cover, each unit having a blowout device provided with a removable arc chute made of a special grade of heat-resisting material.

Mounted in the same case as the master switch, and interlocked with the latter, is the hand-operated reverser, the interlocking ensuring that the reverser can only be moved when the master switch is in the " off " position. Included in the case of the contactor group is a current-limit relay, which automatically regulates the acceleration and safeguards the motor from being severely overloaded. The vehicles are provided with convenient " Numa " bells, a speedometer, and emergency lighting.

Some Radio Developments.

Radio Loud-speakers, Electrical Gramophone Pick-ups, and New Sound-Recording Apparatus.

(Extracts from a lecture delivered before the INSTITUTION OF ELECTRICAL ENGINEERS.)

AS is invariably the case when demonstrations of any kind are arranged, "standing room only" was the order of the evening when Mr. S. G. Brown, F.R.S., M.I.E.E., delivered his lecture on the above subject before a crowded London audience last week.

Having referred to the early use of headphones for wireless reception, Mr. Brown said that his loud-speaker patent of 1910 was taken out after he had invented the single-point telephone relay, which magnified the voice over long-distance telephone lines, and that patent also covered the cone loud-speaker which had now become so popular. Cone loud-speakers were actually tested in 1910, but they were not sufficiently sensitive with the crystal sets then available, before the invention of the thermionic valve. It was therefore necessary to start with the horn-type of instrument, the familiar original sugar-scoop design and the well-known H1 Brown curved-horn type developed some ten years later; the latter was from the beginning an exponential instrument and, it was claimed, set a standard of excellency which had never been attained by any horn loud-speaker before, and it was still in great demand. Indeed, although the public fancy had turned to the more compact cone loud-speakers, the lecturer's personal view was that they were not so efficient as the old curved-horn instrument. The introduction in 1924 of the Sterling Co.'s pleated-paper disk loud-speaker and of the Celestion Co.'s first cone loud-speaker was followed by several other types of other companies, but his own firm was slow in putting a cone speaker on the market because it has less volume than the horn type, and he considered that was a disadvantage. However, the public taste was for the cone, and makers must supply what the public wanted.

Illustrating types, the lecturer said that a straight cone with a flexible edge had a good response to the upper musical tones, but was somewhat lacking as regarded the lower tones. A cone constructed more or less on the logarithmic law had a bad response to the high notes and richness of the low notes. The well-known Brown duplex cone, embodying the better features of the first and second types just mentioned and with the paper bent into a horn shape, had a better range and excellent high and low notes. A recent improvement of this type was an electromagnetic movement with a vee-shaped armature, which followed the lower frequencies without distortion, which was not always the case with the flat armature. Cobalt steel was used in the construction of the permanent magnet, but the weight of the permanent magnet must be 9 lb. 7 oz. if the coil was attached direct to the cone. With a smaller magnet and direct cone attachment, the low notes were not obtained so well, but, by operating the magnet through a lever as in the "Peke" loud-speaker, it had been found possible to reduce the weight to 2 lb.; moreover, when operated in this way the coil did more work. Mr. Brown said he had found paper having a thickness of 5 mm. the most suitable for domestic loud-speakers, and a thickness of 15 mm. for power speakers as used for public-address work and talking pictures.

Experiments had shown that the voltage across the coil could rise to as much as 1,000 volts when a singer's voice reached the high notes, and this had led to the development of a speaker which was really two instruments combined, the one to take the high notes and the other the low notes, a small cone being placed in the mouth of the large one. This had given a still greater range of reproduction, which was "as near perfect as possible"; it was doubtful, however, whether this improvement warranted the complication and cost involved. What the future held in store for loud-speakers nobody could say at the moment, added Mr. Brown; alterations would no doubt be necessary to meet popular fancy, and possibly the elimination of the valve might change the entire conditions.

Passing to the gramophone pick-up, the present well-known form of needle vibrating on a very light iron armature carried between two india-rubber washers was illustrated; red rubber had the longest life for this purpose. The Brown No. 3 pick-up had a reed carried by a knife edge, and rubber was used to centralise the reed and provide elastic recovery as before. Whilst being regarded as a very good form, it had been still further improved upon in the No. 4 type. It had been found difficult to prevent pronounced resonance in the upper notes, about 4,000 vibrations per minute, and it was eventually traced to the use of laminated iron in the magnetic circuit; solid-iron poles gave slightly better results, but still better results were obtained by allowing the laminations to remain and to surround the pole ends with copper, which damped down the upper resonance and brought out the lower tones. Demonstrations were given with various gramophone records of frequencies of 60 and 4,000 with this pick-up.

Another form of pick-up demonstrated worked with a moving coil. It had been designed specially for the lecture that evening, and it consisted of a flat coil on which was mounted a reed, or arm, which carried a needle. The arm was carried on a knife edge and was kept in place by rubber blocks on each side of the knife edge. The flat coil was carried on the upper end of the reed, the lower end carrying the needle, and the shallow coil projected into the field of the permanent magnet. Mr. Brown was confident that the moving-coil type of pick-up was well worthy of development, and would eventually supersede the electromagnetic type.

Reference was then made to what Mr. Brown called a gramophone electric sound amplifier, which he regarded as the most interesting exhibit of the evening. It had been invented by him in an attempt to simplify amplification. The ordinary sound box was replaced by a differential microphone, there being carbon granules on each side of the central disk, which was vibrated by the gramophone needle in the usual way. Only a 6- or 8-volt accumulator was necessary to operate it in order to give five or six times the natural loudness. No valves were employed, and, added Mr. Brown naively, that fact probably accounted for the instrument working so well!

Finally the lecturer demonstrated a machine for making gramophone records direct from a pick-up, thus considerably simplifying the manufacture of records. The recorder consisted of a circular plate about 6 inches in diameter, which was kept revolving by means of a powerful spring motor, the importance of having sufficient power for this purpose being incidentally emphasised. The electric recording pick-up was carried on a hinged arm which was screwed forward steadily at a pre-determined rate. A diamond was used for cutting the record, and experiments were carried out in cutting steel and erinoid records of Mr. Brown's voice, the records being taken immediately from the recorder and reproduced on a gramophone. Admittedly by no means perfect, they appeared to be the beginning of an important development, and the audience showed its appreciation in no uncertain manner. One important feature had been the ascertainment of the proper angle of the diamond point, whilst the most suitable disk material at the moment seemed to be erinoid. However, Mr. Brown expressed the view that in time it would be possible to make records direct in that manner on the usual black material now used for gramophone records, and to eliminate the bugbear of needle scratch. A feature was that such record making was carried out without the use of valves.

Discussion.

Dr. W. H. Eccles, F.R.S., spoke of the pioneer work done by Mr. Brown, and agreed that the horn loud-speaker was the best type, especially if it were made large enough, say, 20 ft. long! The cone speaker had, however, become popular on account of its compactness. The microphone amplifier described was a "terrible threat" to valve manufacturers, and it must be agreed that the reproduction of the record by means of it that evening was excellent, for the record contained high treble notes and deep base notes. As to the recording machine, people had tried to record on all sorts of materials, but it had been left to Mr. Brown during the past few months to get a proper understanding of what was happening under the cutting tool. He had been the first to put the matter clearly, and it was evident that all the things they had been shown required a great deal of scientific knowledge and intuition. The work Mr. Brown was doing indicated that it was necessary to "think with the fingers" as well as the brain, and Mr. Brown had an uncanny way of making things work. Moreover, his originality and fertility in other fields was even greater than in the one he had been dealing with.

Mr. Justus Eck referred to the Edison electrochemical loud-speaker of 50 years ago which was abandoned because it spoke too loudly. The source of energy was a small Leclanché cell, and it worked by means of rotating chalk underneath a platinum contact, the end of which was attached to the centre of a mica diaphragm. If there had been secondary batteries in those days he was inclined to think that such apparatus as the reproducer shown by Mr. Brown would have been possible then.

Mr. A. C. Brown said he preferred to call the Edison speaker an electrostatic or frictional-reed instrument. A similar device had been shown at the Institution some years ago in another form, and he believed a great deal could be

done in that direction. In the old days it was objected to simply because it was a loud speaker. He had thought of trying the carbon microphone mentioned, but Mr. S. G. Brown's patience had been far beyond his own.

Mr. R. S. Whipple asked if Mr. Brown had used a rounded steel point instead of a diamond for cutting his records. One of his colleagues, working along similar lines and using celluloid, had been successful, and the reason appeared to be that the material seemed to flow round the point; there was not a cutting action.

Lt.-Col. H. P. T. Lefroy, D.S.O., M.C., mentioned that in 1913, with Brown WL or G-type instruments in tandem, it had been possible to get the first wireless reception on aircraft at 120 miles an hour. Without those relays it would have been impossible to have obtained the necessary amplification.

Dr. J. McLachlan said that, although loud-speakers were improving, there were still types which recorded high notes better than low ones and *vice versa*, and he suggested it would be useful in future to state the particular types of instruments which particular types of loud-speakers would best suit.

Mr. S. G. Brown, who promised to reply in writing, was accorded a hearty vote of thanks, the president, Mr. C. C. Paterson, complimenting him on the value of the pioneer work that he had carried out.

Legal.

Brown Gyro-compass Patents Extended.

IN the Chancery Division on December 4th, Mr. Justice Luxmoore granted to Mr. Sidney G. Brown, managing director of S. G. Brown, Ltd., an extension for ten years (the maximum term allowed by the Act) of two patents of 1914 and 1916 relating to the construction of gyro-compasses for use on ships Mr. Brown took out the patents in the joint names of Professor John Perry and himself. Mr. Brown said that Professor Perry did the mathematical calculations and he did the invention. The grounds put forward for the extension of the patents were that the invention was of sufficient merit to warrant the extension, and that the inventor had not only not been adequately remunerated, but had suffered loss. It was claimed for the Perry and Brown invention that it provided "the necessary gravitational control of the gyroscope which gives it a north-seeking property, without subjecting the gyroscope to appreciable disturbing forces due to rolling, pitching, or other short-period motions of the ship."

The Comptroller of Patents did not oppose an extension of the patents, but suggested a term of five years.

MR. JUSTICE LUXMOORE held that the invention fulfilled three requirements which justified an extension for the full term of ten years. First, the invention was of the highest ingenuity, and was the result of highly-trained engineering and mathematical skill; it was of exceptional benefit to the public, because anything which made navigation easier and safer was of the greatest importance to the public; and the inventor had not only been inadequately remunerated, but had, in fact, made a substantial loss.

Damages for a Son's Death.

IN the Dublin High Court before Mr. Justice Hanna, on December 1st, an action was heard in which Thomas Hopkins, Dublin, claimed damages against Lewis Clein & Sons, Ltd., Dublin, for the death of his son, Thomas Hopkins, junior, which, he alleged, was caused by the negligence of the defendants in the supervision of certain premises in which his son was working in November, 1929, as their servant.

It was stated that Hopkins, junior, was electrocuted by reason of a defect in, or a defective part of, the defendants' electrical plant, wiring, fittings, or fixtures, and that he received a shock from an electrical installation near a hen-run on the premises at which he was working.

The defendants denied negligence, and said that if the premises were in a dangerous or unsafe condition—which was denied—the deceased man knew and appreciated the risk arising from that condition, and voluntarily accepted it. They also pleaded contributory negligence on the part of the deceased man.

The plaintiff brought the action on behalf of himself and his wife. The jury, finding in his favour, assessed damages at £325, of which they apportioned £175 to the plaintiff, and £150 to his wife.

MR. JUSTICE HANNA gave judgment accordingly, and on the application of Mr. Finlay, K.C., for the defendants, granted a stay of execution for a fortnight.

British Thomson-Houston Co., Ltd. v. Goldvick Electrical & Radio Co.

IN the Chancery Division on December 2nd MR. JUSTICE LUXMOORE gave judgment for the British Thomson-Houston Co., Ltd., restraining the Goldvick Electrical & Radio Co. from infringing plaintiffs' letters patent for gasfilled lamps.

MR. TOOKEY, for the plaintiffs, moved for judgment in default of appearance and defence by the defendants.

His Lordship, besides granting the injunction, ordered the delivery-up of infringing articles, and directed an inquiry as to damages.

Interference with a Meter.

AT the Whitehaven Police Court last week, Robert McDonald, a miner, was charged with preventing an electricity meter registering his consumption of electricity. A meter reader stated that upon inspecting defendant's installation he found that a piece of wire had been fixed across the meter from one fuse box to the other. The defendant said that he did this to test the meter which he believed to be faulty. There was an "unused" shilling in the meter. A mains superintendent agreed that the defendant's consumption for the quarter was normal.

The magistrates thought that there was no intent to defraud and dismissed the charge on payment of costs.

Parliamentary News.

[By our Special Parliamentary Reporter.]

The Unemployment Insurance Commission.

On December 1st MR. SNOWDEN, the Chancellor of the Exchequer, informed Sir A. Pownall and Mr. E. Brown that the terms of reference of the Royal Commission on Unemployment Insurance would be: "To inquire into the provisions and working of the Unemployment Insurance Scheme, and to make recommendations with regard to:—(1) Its future scope, the provisions which it should contain and the means by which it may be made solvent and self-supporting; and (2) the arrangements which should be made outside the scheme for the unemployed who are capable of and available for work."

The Commission would be a small body of persons selected by the Government and not nominated by particular interests and would include one member with experience of local government. Its composition was not yet complete, but he was able to say that His Honour Judge Holman Gregory had consented to act as chairman.

G.W.R. Dock Developments.

On December 1st MR. MORRISON, Minister of Transport, informed Mr. Henderson that the scheme submitted to the Development (Public Utility) Advisory Committee by the Great Western Railway for Cardiff Docks was for the provision of six appliances capable of dealing with 20-ton wagons in lieu of existing hoists; twelve electric cranes in lieu of existing steam and hydraulic cranes; and new electric pumping plant in lieu of existing steam plant. The estimated total cost of the work was £325,000 and formed part of a comprehensive scheme for the modernisation of the company's South Wales Docks at a cost of £3,222,000. The assistance offered by the Treasury, with his concurrence, and after consultation with the Development Committee, took the form under Section 2 of the Development (Loan Guarantees and Grants) Act, 1929, of a grant towards defraying the interest on the capital expenditure incurred, and was estimated to have a present value equivalent to a capital contribution towards the whole scheme of approximately £972,000.

Telephony to South America.

On December 1st, MR. LEES-SMITH, Postmaster-General, informed Mr. Matters that he hoped it might be possible to provide a direct telephone service with Argentina within the next two or three weeks. This service would afford communication also with Uruguay and Chile by means of landline connections from Buenos Aires. He was considering the question of establishing direct telephone communication with Brazil, but he was not in a position at present to make any announcement on the subject.

Lamps for Pit Ponies.

On December 2nd MR. FREEMAN asked the Secretary for Mines whether he had any information concerning the provision of a headlamp for pit ponies in mines with a view to minimising accidents and injury; and, if so, whether he was taking any steps to secure its adoption.

MR. SHINWELL said he had authorised the use of a modified form of an approved electric cap lamp for experimental trials underground for this purpose at a mine in Yorkshire, and the progress of those trials would be watched with interest by his Department. Some provisional experiments had also been made in South Wales with an ordinary cap lamp. So far as they had gone, the experiments were encouraging. His Department would continue to watch them closely and would encourage any further experiments in the same direction.

Imports of Electrical Instruments.

On December 2nd MAJOR COLVILLE asked the President of the Board of Trade if he could account for the four-fold increase

in the value of electrical instruments, other than telegraphic and telephonic, imported during the ten months ended October, 1930, as compared with the years 1928 and 1929, respectively.

Mr. Graham said that the increase in the imports into this country of electrical instruments (other than telegraphic and telephonic) registered during the first ten months of 1930, compared with the imports during the corresponding months of 1928 and 1929, was due to sound-recording and reproducing machines and parts thereof being included under this heading.

Empire Broadcasting.

On December 2nd Mr. Viant told Mr. Hurd that a scheme proposed by the British Broadcasting Corporation for the provision of an Empire broadcasting service was submitted to the Communications Committee of the Imperial Conference. One of the details of the scheme was the broadcasting of three news bulletins daily. A copy of the scheme and of the Communications Committee's report on it would shortly be published.

Automatic Train Control.

On December 3rd Mr. Hall Caine asked the Minister of Transport if every opportunity was given to inventors to demonstrate the models of their inventions before the Automatic Train-Control Committee; and what was the number inspected.

Mr. Morrison replied that the Committee had now reported and its report would shortly be published.* The Committee examined a large number of specifications, or suggestions, which were brought to its notice by inventors and others, but it would appear that only in a few cases did the Committee think it necessary to give inventors opportunities to demonstrate models of their inventions.

Electricity on Farms.

On December 3rd Colonel Clifton Brown asked the Minister of Transport if his attention had been drawn to the difficulties of increasing farm electrical development owing to the fact that compensation for such improvements was not obtainable under the existing law; and if he was considering the matter.

Mr. Morrison said that this matter had been considered by the Electricity Commissioners in consultation with the Departments and representative bodies concerned. In the case of Scotland, provision had been included in Part II of the First Schedule to the Small Landholders and Agricultural Holdings (Scotland) Bill with a view to the amendment of the existing law. In the case of England and Wales the question had been noted for consideration in connection with any future electricity legislation.

Safety in Mines.

On December 3rd, during a discussion on accidents in mines, Mr. Duncan Millar, a Liberal member, urged that care should be taken in the provision of lamps. Blame could be attached to the miners in certain cases because they refused to use the special lamp. He would like to see some form of safety lamp or electric lamp provided which would be a better substitute for the naked light than the lamp at present in use. Better lighting of the working face would do something to prevent the spread of nystagmus, which was an important point to keep in view.

Mr. Shinwell, the Secretary for Mines, agreed that cases of nystagmus were attributable to deficient lighting. Therefore, the Mines Department was devoting attention to the question of better illumination, and it was submitting to the industry a draft Order for discussion and, it was hoped, endorsement. These new proposals aimed at a general improvement in the standard of lighting in three principal directions. First, there was the raising of the minimum candle-power standard of miners' safety lamps—not only the flame lamp, but the electric lamp also. Then they proposed to provide a relaxation in the present drastic statutory restriction on methods of lighting other than safety lamps. That subject was full of difficulties, because there was a dispute as to whether the use of electricity in the pits for lighting was desirable. Then they also proposed to secure definite provision for a reasonable standard of surface lighting, which hitherto had not been regulated by law, except for railway shunting operations.

*The report has now been published as mentioned elsewhere in this issue.

Radio Communication.

On December 4th, Mr. Hacking moved to omit from the Expiring Laws Continuance Bill the Wireless Telegraphy Act, 1904, so as to give the Postmaster-General an opportunity of making a statement, and said that there had been a good deal of complaint from the south-east of England of interference caused by certain Continental broadcasting stations. He hoped the Postmaster-General would make representations to those stations that they should use wavelengths which would reduce interference to a minimum. He hoped also that the Postmaster-General would deal with broadcasting from Moscow.

Mr. Lees-Smith said that as Russia was not invited to the International Radio Conference held in Washington some years ago, that country considered that it was not bound by the international regulations of wavelength, and used certain wavelengths which were inconvenient to other nations. Russia did attend, by invitation, the last Conference held at Prague, but, while agreeing to come to a certain extent within the general international regulations, she insisted on operating some of her previous wavelengths. It was through one of those wavelengths that on certain nights for weeks past she had been regularly transmitting messages to this country. The Stuttgart station was observing the international regulations, but, having lately greatly increased its power, it could frequently be heard behind the London National programme. The matter could only be settled by negotiations, which were proceeding.

As to television, an arrangement had been come to between the Baird Company and the B.B.C., by which the Baird Company was given the right of sending television pictures and voice production for half an hour six times in the week outside broadcasting hours. So far as he knew both parties were satisfied with the experiments up to the present, and no complaints had been made to him.

The Trans-Atlantic telephone service was now open for 24 hours in the day. It worked on four wavelengths, one long and three short wavelengths. One of these wavelengths had been lately introduced, and another long wavelength, it was anticipated, would be introduced in perhaps two years. The service at present carried between 300 and 600 messages a week, and was undoubtedly the greatest commercial success. The Australian service was opened some months ago. It had not been possible to open a service to New Zealand at the same time because New Zealand had not a corresponding station. Arrangements were, however, being made by which we should be able to communicate with New Zealand *via* Australia, and he hoped that the service would be opened in a few days' time. Canada had expressed a wish for a direct service with this country, and it would be opened within two or three months. No service with South Africa was in immediate sight, and in the case of India arrangements still had to be made.

The amendment was withdrawn.

Correspondence.

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession.

The Prevention of Accidents.

The series of articles by Mr. T. C. Gilbert concluded in your issue of November 21st (in which he suggests the use of devices to trip a breaker upon the leakage of current to earth before any dangerous conditions develop) has been followed by me and others with interest, especially the latter part of page 858 and page 859 (November 21st, 1930).

Your readers will be interested to hear that I applied for two patents in January, 1929, covering the protection of electrical installations by these means. The features covered include a system of leakage and/or overload protection devices placed near or at the main switch and on the " ways " of distribution boards, so that leakage very much less than the overload capacity of fuses, &c., will cause an indication of a fault and/or disconnection of the faulty circuit as may be desired.

The systems cover also the use of special house wire, having an insulated earth sheath, connected through the devices to earth; the feature of the test button and artificial fault is also incorporated. The patents do not depend upon any special form of device, and those so ably described by Mr. Gilbert might be incorporated, but my invention does for the whole system what the " Sbik " switch does for individual pieces of apparatus.

A licence for my system of wiring has been taken by an important firm of cable makers, which is at the moment engaged in completing arrangements for putting this super-system on the market in connection with both lead-covered and c.t.s. wires.

W. Fennell.

Northwich, *November 22nd*, 1930.

Reading the articles which have been published in the ELECTRICAL REVIEW during the present year from the able pens of Dr. Ekstrom and Mr. Gilbert, one feels sorry for the poor ignorant lay public which is being exposed to the dreadful dangers of mutilation and death by the inevitable progress of electrical distribution. Is it permitted to inquire what is the underlying motive of this scare literature and the apparent urge to "save the other person"? Dr. Ekstrom can find safety remedies only in Continental practice, and Mr. Gilbert in a German switch; surely we have plenty of British brains able to cope with the situation.

Although frankly a heretic in matters of safety by compulsion, *i.e.*, by law, I agree with Mr. Gilbert that complete safety will only be obtained by the complete and absolute insulation of all current-consuming devices, and would therefore urge our manufacturers to get busy and flood the markets with such goods at reasonably competitive prices, before the Continentals cut the ground away from their feet.

There is one point I would like to stress: it is that in all these discussions the "earthing" arrangements necessitate appreciable lengths of wire between the device to be protected and the "earth"; this wire necessarily has resistance and is liable to be broken or otherwise disconnected. Why not earth each separate fixed device *where it stands*, and so prevent a potential difference arising—on a fault—between the device and the ground on which a person touching it stands? All portable apparatus should be fully insulated, and, where a water main is used as "earth" for metallic sheathing or conduit, *all* pipes supplying water to taps, boilers, and storage tanks should be bonded together and to the same water main. Fatalities have occurred due to persons in baths touching radiators and the like, which had become alive through faults or surface leakage, but, had both bath and apparatus frame been bonded together and locally earthed, I maintain that such fatalities could not have occurred.

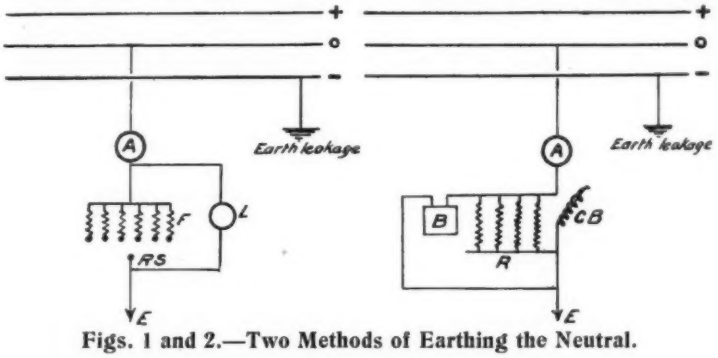
It is useless making more and more stringent regulations and losing sight of the fact that the public will buy cheaply; a section of the trade will always accommodate such a public, and we cannot, as things are at present, prevent the Continental manufacturer supplying shoddy materials to such contractors. Let us use common sense; earth all fixed apparatus locally, for if the surrounding ground is sufficiently conductive to enable a person to receive a severe shock, it is good enough to earth the apparatus and so prevent the possibility of such a shock; if not, where is the danger?

G. S. Boothroyd.

Bexley, *November 29th*, 1930.

With reference to Mr. Gilbert's excellent articles in the ELECTRICAL REVIEW on earthing domestic appliances and the possibility of high voltage between neutral and earth, I enclose two diagrams showing the methods of earthing the neutral adopted by two large supply undertakings.

I am not finding fault with either of these "earthing" systems, as some means must be adopted to limit the heavy currents to earth whenever a leakage occurs on the outer conductors. Supply engineers know this as well as I do, but I am afraid there is a large number of contractors and wiremen still under the impression that the neutral is always at "earth" potential under all conditions of service



Figs. 1 and 2.—Two Methods of Earthing the Neutral.

Fig. 1 shows a centre-zero ammeter A, fuses F, rotary switch RS, and earth lamp L. The fuses are graded and, if the earth leakage is very low, only the smaller fuses will blow when the switch is operated. If there is a "dead" earth on the outers, any of the fuses will blow, and the "earth" lamp will give a full glow.

Fig. 2 shows a centre-zero ammeter A, circuit breaker CB, resistance R, and bell B. When the circuit breaker is closed the neutral bar is "dead" to earth. Should the circuit breaker operate owing to a heavy leakage to earth, the resistance will limit the flow and the bell will ring to warn the attendant.

It is plain to see that if there is a "dead" earth on either of the outer conductors in fig. 1, there is a potential difference of 230 volts between neutral and earth.

In fig. 2 the potential difference between neutral and earth will depend on the value of the resistance R.

I hope this explanation will be useful to those who have very little knowledge of power-house work.

F. Stevenson.

Hull, *December 5th*, 1930.

Problems for Research.

Mr. C. C. Paterson's presidential address to the I.E.E. gave proper prominence to questions of research within the industry. Many research engineers, however, must be twiddling their thumbs over routine problems which, while of importance to their respective firms, are not of vital consequence to what I would call the electrical public as a whole.

There is awaiting solution a number of problems which could be tackled if funds were raised and applied for the purpose. The sum total spent upon research by all classes of electrical manufacturers must be very large, and probably there is available a large proportion of it which could be pooled and utilised for dealing with certain vital matters which hitherto have not received attention. Doubtless many of your readers can think of a number of such problems, the solution of which would confer considerable benefits upon the public.

I will start the ball rolling by emphasising the need for an untwistable (dreadful word) flexible cord for telephones, electric table utensils, vacuum cleaners, irons, &c. The inextricable tangle into which the flexible of a simple telephone can work itself within a few days of its being installed quite new is marvellous! It must give the lay mind the impression that something should be done to remedy what, in an office at any rate, ultimately causes immense annoyance and is a check on efficient working.

Surely a little money spent on experiment and research in this direction could give the greatly desired result.

W. E. Warrilow.

Oxhey, Herts., *November 29th*, 1930.

Too Old at Forty?

I believe that this subject has been discussed fairly frequently of late, and has become a very vexed problem.

I have recently returned from abroad, and find that I am debarred from accepting many positions due to the age limit fixed by many firms and Government agents. Just recently I applied for a position with a well-known oil company as an electrical engineer and was turned down, apparently, on the age question. I wrote to the particular firm, expressing my views, and the answer I received was that there was no suitable vacancy for me. There was not the slightest attempt to discuss the points raised by me.

One conclusion I have come to is that the insurance companies are the real dictators and are the originators of the age limit scheme, and that therefore any Government concern or firm backed by the Government is powerless in their hands. Personally, I am prepared to waive, in applying for any post out East, any terms relative to insurance. I would sooner make my own arrangements about that side of the question.

For the benefit of your readers I will endeavour to state as briefly as possible the views I expressed in the letter referred to above. I was 35 years of age when I went out to India first, and with the experience thereby gained I consider I am now more fit for a job in the East than I was then. I was fortunate, probably, in that I never contracted any tropical diseases, and am therefore in no way rendered unfit by my five years' experience in India and the Federated Malay States. I was not incapacitated by my 4½ years' experience during the war. In addition, I am Australian born and of Australian parents, and in that respect I am probably more fit for an Eastern life than a man fresh from this country, whose aptitude for living in the tropics is always a matter of conjecture until he has been tried out. I also consider that the actual number of years is no criterion of an individual's capacity for resistance against tropical diseases, and in many ways the idea of an age limit is a fallacy.

Regarding the war period, I do not want to emphasise the time I spent in duty to my country, but, if a man of 35 is required for a position out East, and if he is one who also carried out his 4½ years as his duty to the country, then I fail to see that he could have acquired the amount of experience required for the position in question. Finally, I do emphasise that it is after all a question of individuality. I have seen many young fellows of 25 to 30 crack up in the first few months out East who have had to be sent home, the reasons in most cases being that the climate was too much for them, and that they did not know how to drink whisky decently and keep their expenses down.

I don't know if I have thrown any new light on this question, but it is rather galling when one remembers being told as a youth that one could not be considered to be an engineer of any standing till the age of 40 was reached, and now that I am 40 I am told I am too old. In addition, 4½ years of war

have intervened, and that period should be deducted from one's age, for it is certain that if another war broke out one would not be too old then.

Young at 42.

December 4th, 1930.

Holding Companies.

Public electricity supply staffs and many consumers are viewing with considerable apprehension the recent introduction of "holding" companies in connection with electricity supply.

Does so local a statutory service as electricity supply benefit by drawing its capital from a non-statutory company, or is the system merely adding still more standing charges for the consumer to pay? Should not the finance of this prospering industry be negotiable through more open channels, without the intervention of a "holding" company?

We hear the advantages of "central buying" mentioned, but here again is room for doubt. If "central buying" means extra discounts for quantities, then the subsidiary companies or the remote consumers do not necessarily benefit. Manufacturers may be willing to give extra "quantity" discounts (which, incidentally, cannot greatly benefit industry), but how much more than these discounts will be absorbed to support the "central buying" organisation?

Any undertaking must necessarily have a local organisation which should, in these days, be fully capable of completely minding its own business.

Invictus.

December 1st, 1930.

British Motor Prices.

Your correspondents, when comparing the prices of electric motors with gas and oil engines, appear to overlook the fact that whereas engines are prime movers, electric motors are merely converters of energy. There is more skilled labour required in the manufacture of engines than there is in the manufacture of electric motors, therefore a considerable difference in price per horse-power is inevitable. The method described by Mr. Mallett for fixing the price of their products is the only sensible one. Apparently we have about reached rock-bottom with regard to the price of electric motors to-day.

The writer would like to know whether the long guarantee of some manufacturers is worth anything at all; experience so far has shown that there is always some loophole enabling the manufacturer to evade liability in the event of a breakdown during the guarantee period.

Inspector.

December 6th, 1930.

Hire-purchase of Electric Irons.

The Committee of the Wolverhampton Corporation Electricity Department has introduced a system of hire-purchase which may be of interest to you. An assisted-wiring scheme was brought into operation in June last, under which the installation is put in free of initial charge and the cost of the wiring is recovered through a slot meter by means of an additional charge of 2d. per kWh above the ordinary lighting rates. Every one of these installations is provided with a 5-ampere plug in the kitchen for the use of an iron or any other apparatus. The scheme has proved a very great success, and up to the present date 2,250 consumers have been connected; services are now being laid at the rate of 150 per week.

The Wolverhampton Corporation has had in force for many years a hire-purchase scheme, with quarterly payments, but my Committee realised that this was unsuitable for members of the artisan class, who are taking advantage of the assisted wiring and who receive their wages weekly and budget accordingly. It has therefore introduced a hire-purchase system for irons for the assisted-wiring consumers, under which each consumer pays one shilling down on signing the agreement and one shilling per week for fifteen weeks, which is collected at the consumer's door. This, I think, is something quite new for this country. The new scheme is giving every indication of being a great success, as, although it was only brought into operation last week, one hundred irons have already been sold.

T. A. Margary.

Wolverhampton, *December 4th*, 1930.

Heating and Ventilation.

The last paragraph of the article by Mr. W. B. Parker in the "Electricity for the Home" section in your issue of December 5th appears to indicate a considerable misconception of the facts relating to the comparison between radiant and convection heating.

The statement that "if other conditions, such as ventilation and outside temperature, are equal, the ultimate rise in air temperature will be the same, whether it is in radiant or convective form" is absolutely contrary to the experimental facts. It is physically impossible to produce the same uniformity of interior conditions in a room with convected heat as is automatically produced by low-temperature radiant heat. With the former the difference in temperature between ceiling and floor is usually from 8 to 10 deg. With low-temperature radiant heat the difference is rarely more than 1 or 2 deg. When the panels are on the ceiling the temperature of the floor is actually greater than that of the air at the ceiling level. When, therefore, any interchange of air takes place, as through a window open at the top, all the interior air which passes out of a convection-heated room is at a temperature 10 deg. higher than at the floor. On the other hand, when air leaves a radiant-heated room its temperature is the same at the floor level, namely, 10 deg. less than in the other case.

Obviously, therefore, the statement that the ultimate air temperature is the same cannot be true. The essential superiority of radiant heating is that when the radiant surfaces are suitably located the heat is necessarily distributed more or less uniformly at all levels all over the room, a condition which is a physical impossibility with convective heating.

The modern electric fire is an extravagant method of heating a large room, because not only is there too much convective heat from it, but also the radiant heat which is supplies cannot be uniformly scattered. Such a fire is always located in a position where every chair or table in the room obstructs the distribution of the radiation. In order to be adequate for a room of even moderate size, the intensity of the heat in the region round the fire must be so great that it is impossible to occupy that area in comfort because of the heat, at a time when the remote regions are so isolated that it is impossible to sit in them in comfort because of the cold. This is also one of the principal objections to a coal fire.

I have made many experimental comparisons between the amounts of electric power required for heating the same room: (*a*) with electrically-heated panels, and (*b*) with electric fires. The result is always approximately the same, that the fire needs from 40 to 50 per cent. more electric power than do the panels for the same comfort effect.

Any person can make the same comparison in any room. I recommend Mr. Parker to try it.

There is no kind of heat, the introduction of which will immediately turn a cold room into a warm one, because the amount which must necessarily be absorbed by the surfaces of the wall and the fittings, before the chill is taken off them, is so great that it cannot be introduced into a room in a short time, especially not by electricity, for obvious reasons. Even if it were, it could not safely be immediately absorbed by the surfaces. To raise any heavy body in temperature always takes time.

The difficulty of adapting pure radiant heat in a cold climate is not the quality of the result, but only the cost of, and space occupied by, the large surfaces necessary.

A. H. Barker, M.Inst.C.E.

London, S.W.1, *December 5th*, 1930.

An Order-book Suggestion.

It has occurred to me that manufacturers and wholesale dealers could assist traders and themselves by the adoption of a uniform order book of standard size with the name and address of the manufacturer or dealer printed in a suitable position for folding with tuck-in tab, thus dispensing with the use of an envelope. The retailer could use a rubber stamp for his name and address.

Such books, if provided with duplicate sheets for use with carbon paper and issued to customers and prospective customers, would surely influence trade, and in this way soon repay their initial cost.

Edward W. Smith.

Deal, *December 1st*, 1930.

E.D.A. Advertising.

The advertisements and literature from the E.D.A. are of value in drawing attention to the amenities provided by electricity, but their activities could very usefully be directed towards providing the means to use the labour-saving devices to which attention is called.

There is a very large class of users for whom no provision is made for the use of any electrical apparatus; I am referring to the Municipal Housing Estates where no power points are installed. In the writer's locality, the local authorities have erected over 30,000 houses under various schemes, a large number of which are provided with electric light, and in over 50 houses visited there was not one power point, which is typical of the whole; and this in a district which provides a very large proportion of the electrical machinery and apparatus used in this country. A very much smaller adjacent municipality is providing one point per house, which is a move in the right direction.

There is a keen desire among the occupiers of such houses for labour-saving devices of the more modest types, but the stumbling block is that the average householder jibs at taking out a lamp each time it is desired to use such apparatus, apart from the greatly reduced life of the gasfilled type of lamp when repeatedly handled, and the risk attached to the use of any but small-capacity apparatus from a lampholder. He has not, in the majority of cases, the means to have a point installed, and there is an additional objection that in the event of removal, the outlay incurred would be a dead loss.

I would suggest that the E.D.A. concentrates for a period on educating, or persuading, the local authorities to provide power points in every municipal house, which would help to make its campaign more successful, increase the use of electricity, probably reduce its cost, and increase employment by the demand created for domestic electrical appliances of all kinds.

Progress.

December 8th, 1930.

Electric Cooker Design.

I was very interested to read Mr. N. A. Chesterfield's criticism of the design of cookers in his article in the "Electricity for the Home" section of your issue of November 28th.

Manufacturers have long realised the inconvenience of stooping to the oven, and have attempted to remedy this by raising the hob-level as much as is practicable. By doing so they have been able to keep the oven well off the ground on fairly high legs, which appears to be the best that can be done when it is remembered that a hot-cupboard and grilling-space must be provided between the oven and the hobplate. They also realise that the table-type cooker—although it overcomes the stooping difficulty very well—is too big for the modern kitchenette.

There is one other position for the oven, which seems to have gained some degree of popularity in America. It is arranged some 18 inches *above* the hobplate, the latter being somewhat above table level in height. This arrangement, however, also has its disadvantages, such as the difficulty of successfully removing a milk pudding from an oven shelf situated above eye-level, to say nothing of removing a sizzling joint, or pan of hot fat, from such a position.

What, then, is the solution of this problem? It would be of interest to manufacturers (and certainly to myself) if Mr. Chesterfield would give us his ideas on how cooker-design can be rearranged to overcome his primary objection—the necessity of stooping to reach the oven.

C. H. Judd, A.C.G.I.

Liverpool, *December 2nd*, 1930.

Published Specifications.

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1929.

14,587. "Electrical induction apparatus applicable to resistance welding." J. Achard. November 26th, 1928. (338,172.)

15,349. "Electrical condensers." Dubilier Condenser Co. (1925), Ltd. May 16th, 1928. (311,778.)

17,696. "Method of protecting electric blasting fuses against the action of stray currents." Lignoza Spolka Akcyjna. June 15th, 1928. (313,605.)

20,134. "Flex for transmission of electricity." W. W. Richardson. January 9th, 1930. (338,215.)

21,101. "Totalisators." British Thomson-Houston Co., Ltd., and A. J. Johnson. July 9th, 1929. (338,177.)

21,264. "Electric furnaces." Carborundum Co. December 7th, 1928. (338,131.)

21,787. "Circuit breakers." Electric Construction Co., Ltd., and W. N. Ringrose. July 16th, 1929. (338,179.)

23,969. "Fittings adapted for use in electric wiring system." Callender's Cable and Construction Co., Ltd., and S. J. Bryce. August 6th, 1929. (338,117.)

23,985. "Floor boxes for electric wiring conduits." Dr. O. Faber, P. A. Smith, and Drake & Gorham, Ltd. August 6th, 1929. (338,118.)

24,159. "Thermionic valve circuits." A. A. Thornton (Radio Frequency Laboratories, Inc.). August 7th, 1929. (338,120.)

24,423. "Telephone systems." Automatic Telephone Manufacturing Co., Ltd., and C. Gillings. August 9th, 1929. (338,125.)

24,427. "Method and means for controlling electric motors." Bucyrus Erie Co. August 20th, 1928. (317,721.)

24,435. "Methods of electrically coupling together alternating-current electrical apparatus." British Thomson-Houston Co., Ltd., and E. H. B. Martin. August 9th, 1929. (338,135.)

24,705. "Electric motor control apparatus." English Electric Co., Ltd., and F. Morris. August 13th, 1929. (338,189.)

24,733. "Arrangements for amplifying alternating voltage variations." S. G. S. Dicker (Naamlooze Vennootschap Philips' Gloeilampenfabrieken). August 13th, 1929. (338,191.)

24,853. "Manufacture of loaded copper electrical conductors." Electrical Research Products, Inc. November 24th, 1928. (338,169.)

25,070. "Radiogoniometers." Graham-Amplion, Ltd., and W. J. Rickets. August 16th, 1929. (338,203.)

25,183. "Electric cable systems." Soc. Italiana Pirelli and L. Emanueli. August 17th, 1929. (338,210.)

25,187. "Mountings for electric lamps." Straight-Lite Reflectors, Ltd., and W. L. Turpie. August 17th, 1929. (338,211.)

25,457. Portable electric battery." H. F. Joel, Sen. August 21st, 1929. (338,229.)

26,771. "Wireless receivers." C. S. Agate and J. E. Rhys-Jones. September 3rd, 1929. (338,251.)

26,795. "Electric individual drive for high-speed revolving bodies with vertical spindles." Siemens-Schuckertwerke Akt. Ges. and H. Dietzius. September 3rd, 1929. (338,252.)

27,149. "Electric switches." International General Electric Co., Inc. September 8th, 1928. (318,636.)

27,327. "Means of controlling regeneration in electrically-propelled vehicles." W. A. Stevens. September 9th, 1929. (338,259.)

27,865. "Brush-shifting devices for alternating-current motors with commutating windings." British Thomson-Houston Co., Ltd. September 13th, 1928. (318,977.)

27,995. "Method of, and apparatus for, preventing damage by terrestrial electric radiations and utilising such radiations." G. F. Von Pohl. September 14th, 1929. (338,268.)

28,263. "Internal fittings for cardboard boxes for containing electric lamps and like articles." A. A. Brown. September 18th, 1929. (338,271.)

28,609. "Relays for the protection of alternating-current machines." Siemens-Schuckertwerke Akt. Ges. September 22nd, 1928. (319,369.)

28,646. "Electrical signalling systems particularly applicable to totalisators." Ericsson Telephones, Ltd., F. Limb, and T. Lyden. September 21st, 1929. (338,273.)

29,050. "Light-sensitive apparatus." British Thomson-Houston Co., Ltd. October 4th, 1928. (338,279.)

30,375. "High-frequency broadcasting over power lines." Wired Radio, Inc., and R. D. Duncan, Jun. October 7th, 1929. (338,300.)

31,043. "Mounting of suspended cables and particularly of overhead electrical transmission lines." British Electrical and Allied Industries Research Association, P. D. Morgan, and S. Whitehead. October 12th, 1929. (338,304.)

31,192. "Searchlights." Sperry Gyroscope Co., Ltd., and E. Pearse. October 14th, 1929. (338,305.)

31,343. "Transmission of measurement values over great distances." Siemens & Halske Akt. Ges. October 31st, 1928. (338,306.)

31,568. "Sound-reproducing apparatus for wireless reception of gramophone reproduction." Sachsenwerk Light-und Kraft Akt. Ges. April 13th, 1929. (338,310.)

32,327. "Manufacture of cores for electromagnets, loading coils, or the like." General Electric Co., Ltd., and G. R. Polgreen. October 24th, 1929. (338,321.)

32,498. "Telephone and like signalling systems." Siemens & Halske Akt. Ges. October 25th, 1928. (338,324.)

32,614. "Television or the like systems." Gramophone Co., Ltd., and M. Bowman-Manifold. October 26th, 1929. (338,330.)

32,756. "Device for passing electric cables through the roofs of buildings." W. Peter. October 28th, 1929. (338,332.)

34,021. "Elimination of distortion in telephone lines." Telefonaktiebolaget L. M. Ericsson. November 9th, 1928. (338,352.)

34,625. "Pressure-protecting coverings for submarine cables." Felten and Guilleaume Carlswerk Akt. Ges. December 1st, 1928. (338,359.)

34,981. "Telephone casings for desk and table telephone sets." Mix and Genest Akt. Ges. November 16th, 1928. (338,364.)

35,480. "Electrodes of electric furnaces and electrolytic vats." P. Girod. August 27th, 1929. (338,371.)

35,651. "Mercury-break electrical switches." L. Flandrin and G. C. Levy. November 22nd, 1928. (338,372.)

36,016. "Magnet-adjusting device for electric measuring instruments.' Landis & Gyr Soc. Anon. January 22nd, 1929. (338,379.)

37,119. "Electric cooking apparatus." Falkirk Iron Co., Ltd., H. J. Kennard, A. Kinnes, and W. G. Johnson. December 4th, 1929. (338,393.)

37,988. "Brake-shoe with electromechanical control for the braking of wagons of shunting tracks." F. Deloison. January 7th, 1929. (338,401.)

1930.

1,379. "Apparatus for electrical separation of suspended material from gases." Lodge-Cottrell, Ltd. (International Precipitation Co., Inc.). January 14th, 1930. (338,427.)

1,579. "X-ray devices." British Thomson-Houston Co., Ltd. January 16th, 1929. (338,430.)

2,024. "Insulation of leads to electrical condensers." G. Scarpa. January 21st, 1930. (338,434.)

9,689. "Electric oil-break switches." International General Electric Co., Inc. March 26th, 1929. (338,471.)

11,785. "Luminous electric discharge tubes." General Electric Co., Ltd. April 16th, 1929. (Addition to 315,391.) (338,478.)

13,306. "Electron-discharge tubes or thermionic valves." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. January 4th, 1930. (338,480.)

27,815. "Telephone systems." Automatic Telephone Manufacturing Co., Ltd., and C. Gillings. August 9th, 1929. (Divided application on 338,125.) (338,127.)

Trade Mark Applications.

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from December 3rd:—

Unistart. No. 515,196. Class 8. Fitted electrical switchboards, automatic starting switches for electric motors, electrical relays and resistances, electrical interlocks, being a combination of electrical relays and switches, ammeters and electrically-operated contactors.—Sunderland Forge and Engineering Co., Ltd., Sydenham Rohd Works, Belfast.

Blue spot (lettering and design). No. 515,639. Lettering only No. 516,180. Class 8. Telephones, radio-telephonic receiving sets, sound amplifiers, loud-speakers, instruments for improving the tone of radio receiving sets, electrical time switches, &c.—British Blue Spot Co., Ltd., 94-96, Rosomon Street, Rosebery Avenue, E.C.1.

Gelexcel. No. 516,754. Class 8. Electric accumulators (not for medical purposes).—Chloride Electrical Storage Co., Ltd., Clifton Junction, Manchester.

Ripogloss. No. 517,301. Class 8. Electric cables.—Ripaults, Ltd., 1, King's Road, St. Pancras, N.W.1.

Astonia. No. 515,497. Class 18. Electric heating fires.—Davis & Mawson, Plume Street, Aston, Birmingham.

Railway Electrification in Holland.

Electric traction on railways in Holland goes back to the year 1908, when a double-track section of main line 20 miles in length was equipped. Matters have progressed since then, and at the present time 83 continuous miles of multiple-track have been electrified, according to the *Railway Gazette*. Prior to 1908, when the trains running between Amsterdam, The Hague, and Rotterdam were operated by steam, matters had reached such a stage that something drastic had to be done in order that the carrying capacity of the line could be increased, and later a Commission was formed to study the problem; the decision was reached that the local and intermediate passenger traffic should be carried by electric trains, whilst international passenger and freight trains should continue to be operated by steam locomotives. This scheme is still adhered to at the present time, when 30 additional miles of double track are being electrified. The normal make-up of trains is at present 6 and 7 cars, but there are a few trains made up of 10 cars, including a dining car added at the rear.

New Work for Contractors.

Particulars of new works and building schemes for the use of electrical installation contractors in search of work and all interested in the sale of electrical and allied plant and other products.

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

BARKING.—Extensions, municipal offices; U.D.C. surveyor.

BARNET.—Public baths (£16,000) for the U.D.C.; surveyor.

BARNSTAPLE.—Rebuilding works, Queen Street; J. C. Southcombe, architect.

BARROW.—Girls' Grammar School (£38,000); director of education.

BEXLEY.—Shops (10), Upper Wickham Lane; Mrs. Lewis.

BILLINGHAM.—Public baths (£10,000) for the U.D.C.; surveyor.

BIRMINGHAM.—Aerodrome, Stratford Road; and branch bank, Church Square, Oldbury; city engineer.

BLACKBURN.—Extension of nurses' home (£25,000); secretary, Blackburn Infirmary. Extension of the Grammar School; governors. Extension of Holy Trinity, Griffin, St. Silas and Wensley Fold C. of E. schools; borough surveyor.

BLACKPOOL.—Congregational church, Marton; secretary, Fylde Congregational Council.

BOLTON.—Schools, Whitecroft Road (£42,350) and Crescent Road, for the E.C.

BOSTON.—Canning factory, Skirbeck Quarter, for J. Van Smirren.

BOURNEMOUTH.—Library, Charminster Road, for the T.C.; F. P. Dolamore, borough engineer.

BURNHAM (Bucks.).—R.C. church, Hay Mill estate; Rev. Father A. J. Kay, Slough.

CHEADLE (Staffs.).—Houses (116) for the R.D.C.; Work men's Housing Association, Ltd.

CHELMSFORD.—Five schools (£73,300) for the borough E.C.; director of education.

CHELTENHAM.—Motor coach station, St. Margarets; Black and White Motorways, Ltd.

CHESTERFIELD.—New St. Augustine's Church; vicar.

CHORLEY.—Public baths; borough surveyor. Three senior schools; R. L. Roby, secretary of education.

CORNWALL.—School, Bodmin (£11,000), for the county E.C.; director of education, Truro.

COVENTRY.—Schools, Green Lane (£14,436), for the borough E.C.; director of education.

CRADLEY HEATH.—Bazaar premises, High Street, for F. W. Woolworth & Co., Ltd., London.

DAGENHAM.—New St. Martin's Church; vicar.

DERBYSHIRE.—Secondary school, Normanton, for the county E.C.

DEWSBURY.—Water works; G. E. V. Boldry, water engineer, Waterworks Office, Church Street.

DONCASTER.—Guildhall extensions, with block of offices; also swimming, slipper and turkish baths, Catherine and St. James Streets (£40,000); R. E. Ford, surveyor to the Council, 3, Priory Place.

DUDLEY.—Rehousing scheme, New Hall Street area; borough engineer. Mission church, Swan Street, Netherton; W. Hancox. Factory, Castle Mill Road; C. Williams. School (450 places) for the borough E.C.; G. C. V. Cant, clerk.

DUMBARTON.—Filtration, &c., works (£17,000); burgh surveyor. Sewage disposal works, Vale of Leven; Dumbarton C.C. surveyor.

DURHAM.—Extensions, Holywood Hall Sanatorium, Wolsingham, for the C.C.; W. J. Merrett, county surveyor, 43, Old Elvet, Durham.

EDINBURGH.—Synagogue; Rabbi, Edinburgh Hebrew Congregation.

ESSEX.—Technical college, Leyton, for the county E.C.; director of education, Chelmsford.

FINEDON.—Post office for H.M. Office of Works, King Charles Street, London, S.W.

FLEETWOOD.—Houses (100); surveyor to U.D.C. Dock (£50,000); L.M.S. Railway.

GLOUCESTER.—Schools (480 places) for the borough E.C.; director of education.

GOOLE.—Housing scheme for R.D.C.; Council surveyor.

HULL.—Tenements (102), Southcoates Lane (£44,940); A. E. Jones (Hull), Ltd. Wharf reconstruction, Lime Street; Anglo-American Oil Co., Ltd. Kinema and shops, Southcoates Lane; C. H. Benwell.

ILKESTON.—Waterworks (£77,000); Ilkeston & Heanor Water Board.

JARROW.—Electric lighting installation at Grange, Bede Burn and Dunn Street schools for the T.C. (£715).

KING'S LYNN.—School extensions for the borough E.C (£12,490); R. S. Jellings, Ltd., builders, Peterborough.

LIVERPOOL.—Houses (590), Dovecot estate; director of housing, Municipal Buildings, Dale Street. Extension of art gallery (£47,000); Tyson, Ltd., builders, Dryden Street.

LLANDUDNO.—New St. Michael's Church, Llandudno Junction; trustees.

LONDON (Willesden, N.W.).—School (400 places), Braincroft Road, for the E.C.

(Plumstead, S.E.).—Reconstruction, Plumstead Kinema; C. Masey, architect.

(Wimbledon, S.W.).—Reconstruction, Queen's Kinema: licensee.

(Kensington, W.).—Offices, &c., Pembroke Road; John Barker, Ltd.

(Paddington, W.).—Tenements, Brindley Street; borough engineer.

MAIDSTONE.—Houses (677) for the T.C.; borough surveyor.

MANCHESTER.—Omnibus depôt, Parrs Wood (£50,000); city engineer. Extensions, Deansgate (£750,000), for Kendal, Milne & Co. (Harrods), Ltd.

MIDDLESEX.—Secondary school, Northwood, for the county E.C.

NORTHALLERTON.—R.C. church and school; rector, Sacred Heart Church.

NORTHAMPTON.—Offices and workshops, Bridge Street and Market Road; J. G. Pullen, Ltd.

NOTTINGHAM.—Central school, Rosehill Farm estate, for the E.C.

OKEHAMPTON.—Re-erection of Okelands (mansion) for Mr. Gratton.

OXFORD.—Houses (144), Cuttleslowe estate; city surveyor. Alterations, Otley Road; Oxford Ice Rink Co., Ltd.

RAMSGATE.—Bazaar premises, High Street, for Marks and Spencer, Ltd., London.

ROMFORD.—Houses (140), Alfreds Way, for Suburban Developments (London), Ltd. Extensions, poor law institution (£35,000), for Essex Public Assistance Committee; J. Stuart, county architect, Chelmsford.

ROWLEY REGIS.—Senior school (£28,488) for the E.C.; Bridgwater Bros., builders, Cradley Heath.

ST. HELENS.—School, Parr (960 places), for the borough E.C.; director of education.

SHIPLEY.—Houses (300) and shops (12); U.D.C. surveyor.

STIRLINGSHIRE.—Schools, Bainsford (£27,000), Kilsyth (£31,000), Larbert (£37,000), and Stirling (£17,000), for the county E.C.; J. Coutts Morrison, director of education, Stirling.

SURREY.—Secondary schools, Sanderstead, for the county E.C.; W. W. Finney, secretary, Kingston-on-Thames.

WALLASEY.—Houses (200), Pasture Road; L. St. G. Wilkinson, borough surveyor.

WAKEFIELD.—Houses (500); city architect. X-ray and orthopædic department at Clayton Hospital (£12,000); H. Watson, architect.

WEST SUSSEX.—Extensions, Graylingwell Mental Hospital, including nurses' home and admission hospital; E. H. Blaker, clerk, Chichester. School (400 places), Bognor Regis, for the C.C.; county architect, Chichester.